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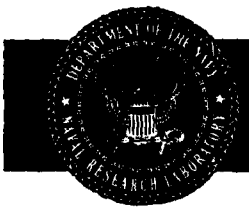

NAVAL RESEARCH LABORATORY Washington, D.C.

FACT BOOK JANUARY 1970

Report Documentation Page

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OMB No. 0704-0188

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JAN 1970		**00-00-1970 to 00-00-1970**

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a. REPORT	b. ABSTRACT	c. THIS PAGE			
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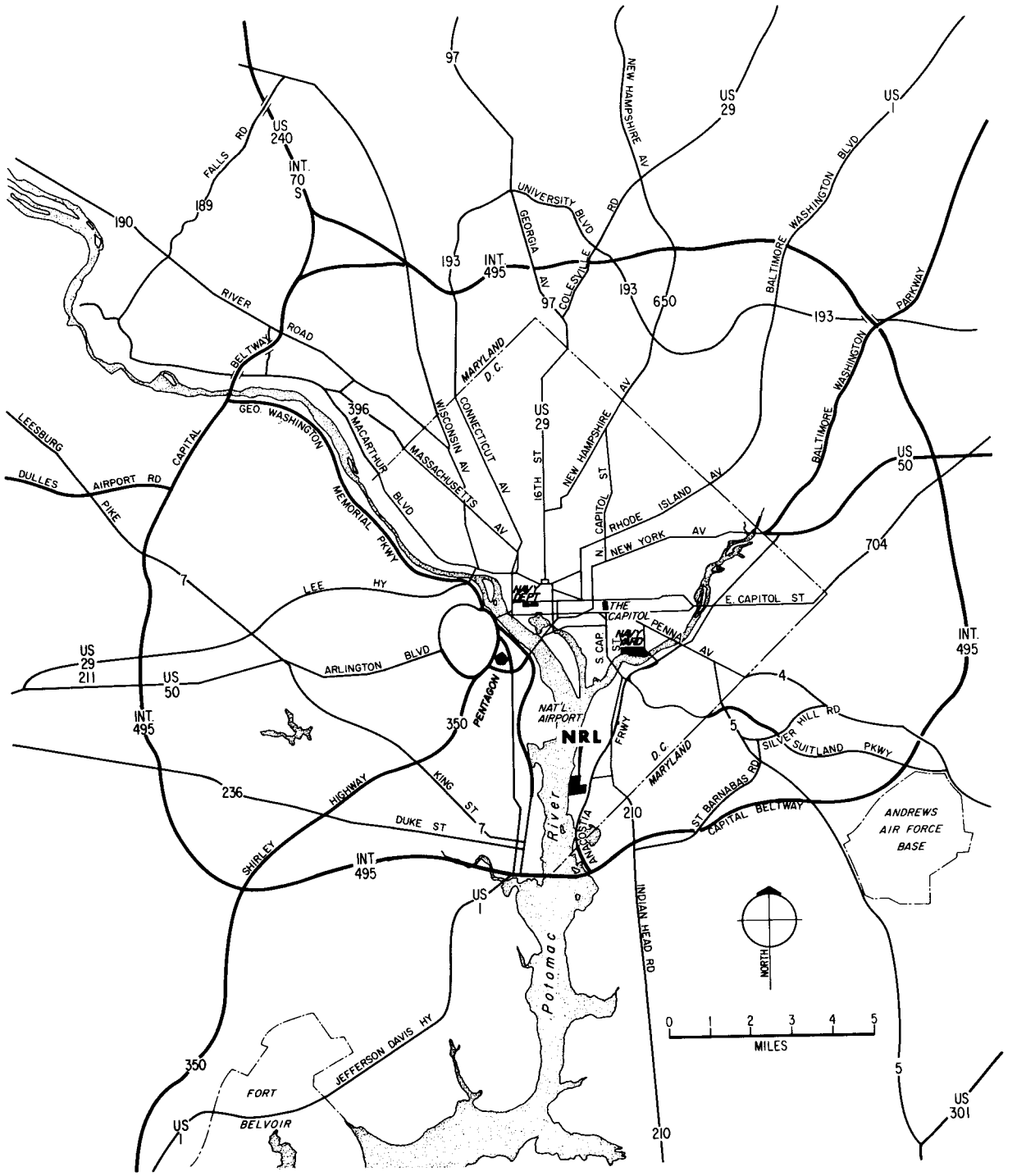
This document has been prepared as a reference source of factual information about the Naval Research Laboratory.

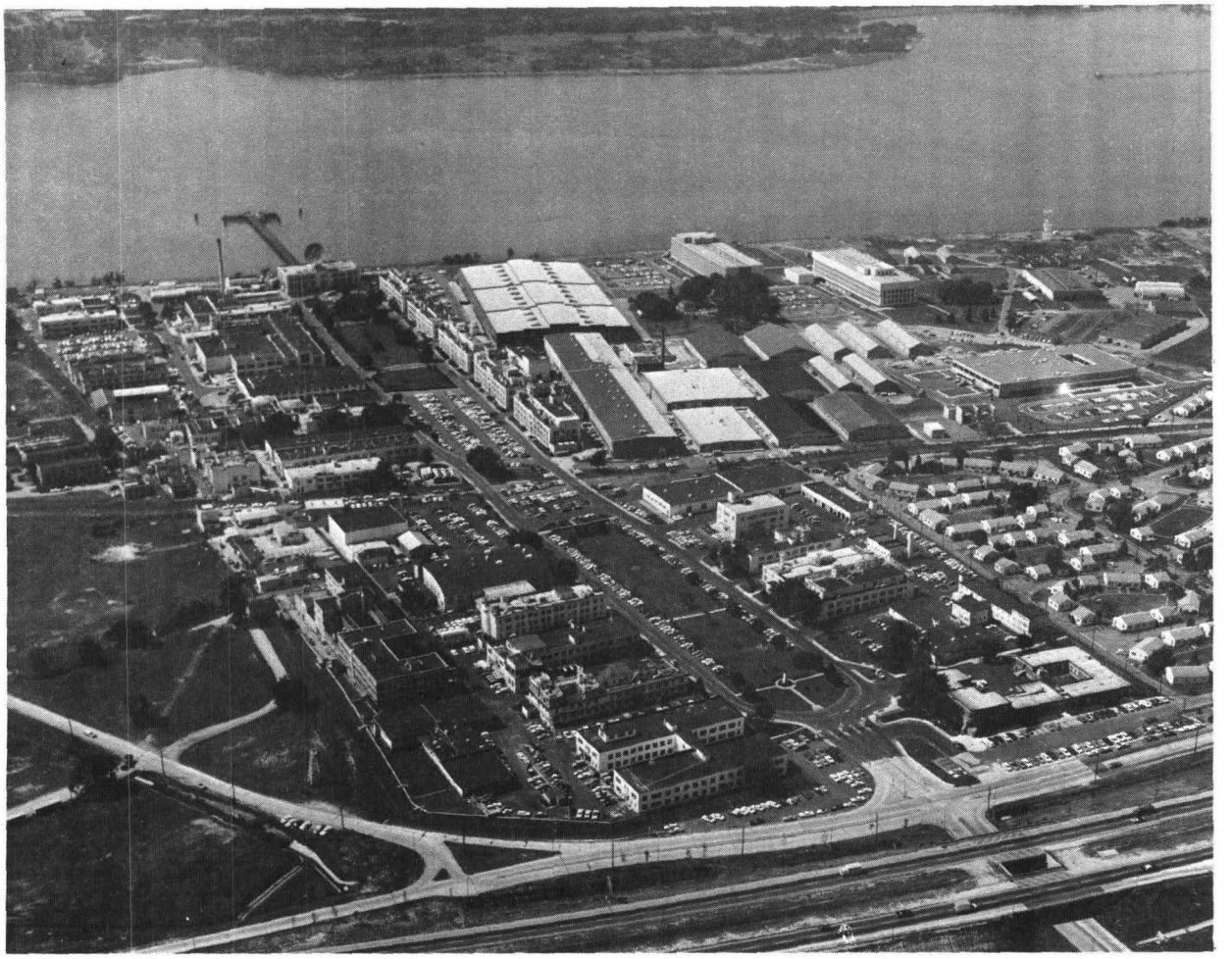
January 1970

CONTENTS

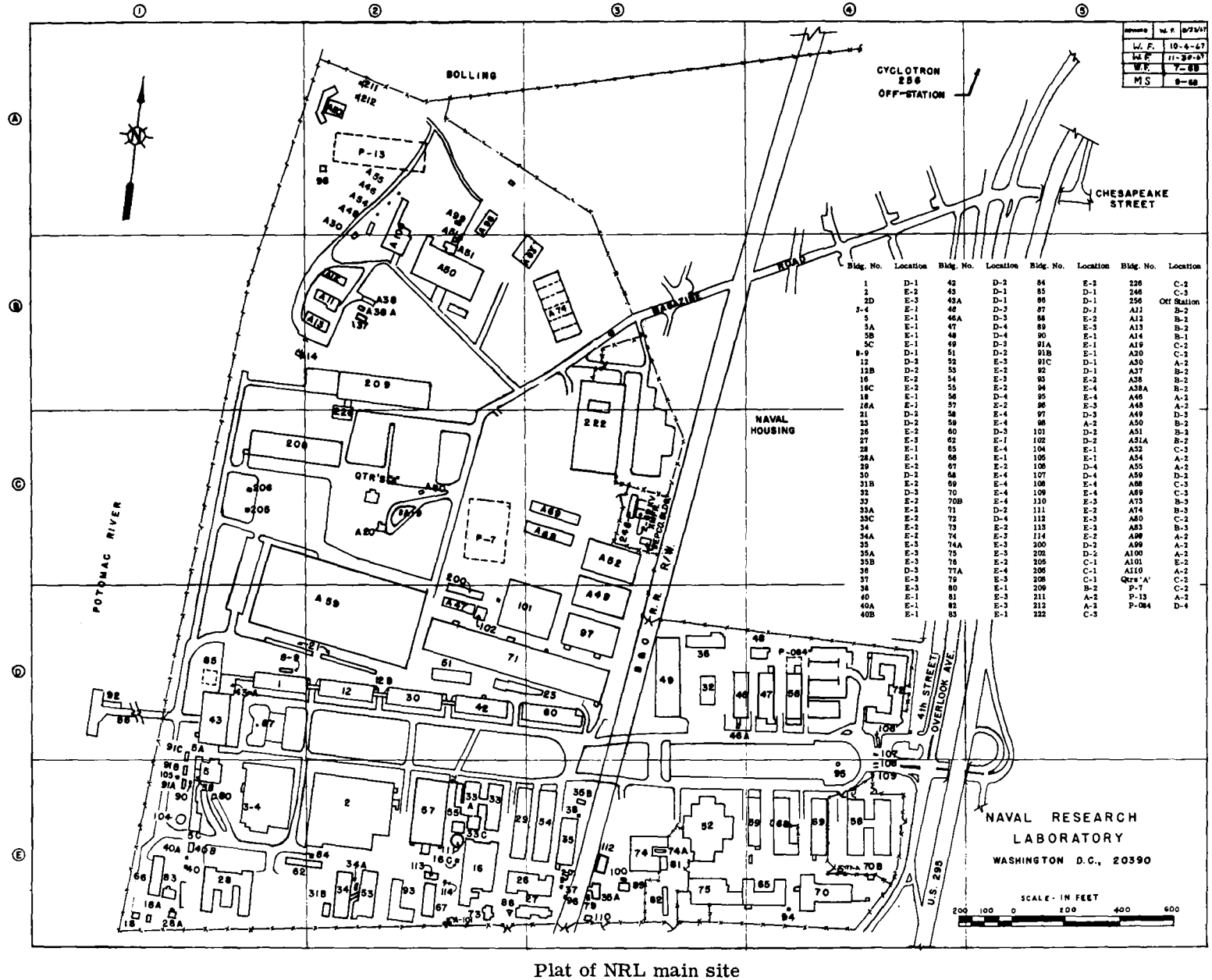
Part 1
The Corporate Structure



Map showing location of NRL

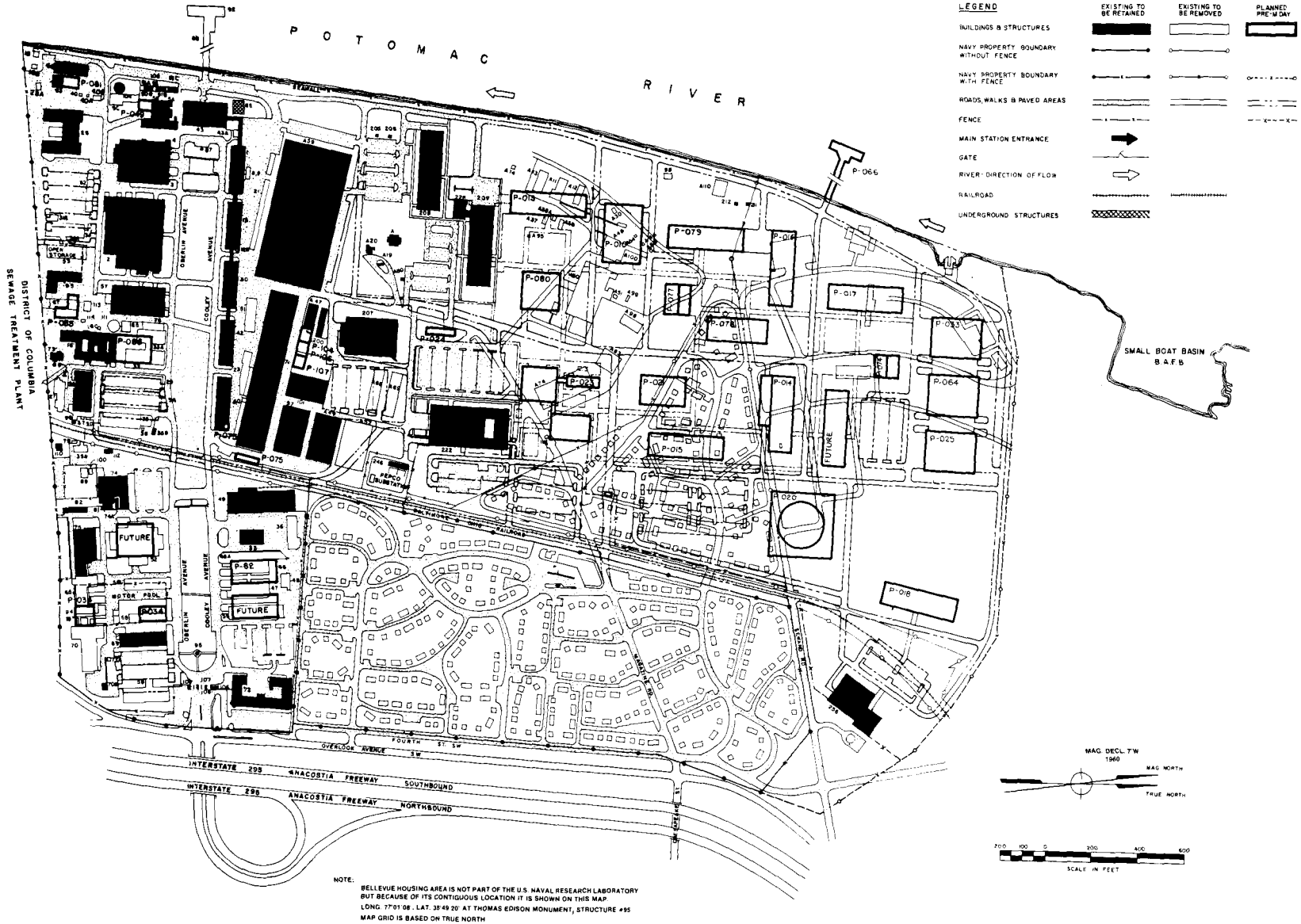


Aerial view of the Naval Research Laboratory main site



Bldg. No.	Location	Bldg. No.	Location	Bldg. No.	Location	Bldg. No.	Location
1	D-1	42	D-2	84	E-2	226	C-2
2	E-2	43	D-1	85	D-1	246	C-3
2D	E-3	43A	D-1	86	D-1	256	Off Station
3-4	E-2	46	D-3	87	D-1	A11	B-2
5	E-1	46A	D-3	88	E-2	A12	B-2
5A	E-1	47	D-4	89	E-3	A13	B-2
5B	E-1	48	D-4	90	E-1	A14	B-1
5C	E-1	49	D-3	91A	E-1	A19	C-2
8-9	D-1	51	D-2	91B	E-1	A20	C-2
12	D-2	52	E-3	91C	D-1	A30	A-2
12B	D-2	53	E-2	92	D-1	A37	B-2
16	E-2	54	E-3	93	E-2	A38	B-2
16C	E-2	55	E-2	94	E-4	A38A	B-2
18	E-1	56	D-4	95	E-4	A46	A-2
18A	E-1	57	E-2	96	E-3	A48	A-2
21	D-2	58	E-4	97	D-3	A49	D-3
23	D-2	59	E-4	98	A-2	A50	B-2
26	E-2	60	D-3	101	D-2	A51	B-2
27	E-3	62	E-1	102	D-2	A51A	B-2
28	E-1	65	E-4	104	E-1	A52	C-3
28A	E-1	66	E-1	105	E-1	A54	A-2
29	E-2	67	E-2	106	D-4	A55	A-2
30	D-2	68	E-4	107	D-4	A59	D-2
31B	E-2	69	E-4	108	E-4	A68	C-3
32	D-3	70	E-4	109	E-4	A69	C-3
33	E-2	70B	E-4	110	E-3	A73	B-3
33A	E-2	71	D-2	111	E-2	A74	B-3
33C	E-2	72	D-4	112	E-3	A80	C-2
34	E-2	73	E-2	113	E-3	A83	B-3
34A	E-2	74	E-3	114	E-2	A98	A-2
35	E-3	74A	E-3	200	D-2	A99	A-2
35A	E-3	75	E-3	202	D-2	A100	A-2
35B	E-3	76	E-2	205	C-1	A101	E-2
36	D-2	77A	E-4	206	C-1	A110	A-2
37	E-3	79	E-3	208	C-1	Qtrs 'A'	C-2
38	E-3	80	E-1	209	B-2	P-7	C-2
40	E-1	81	E-3	211	A-2	P-13	A-2
40A	E-1	82	E-3	212	A-2	P-084	D-4
40B	E-1	83	E-1	222	C-3		

Plat of NRL main site

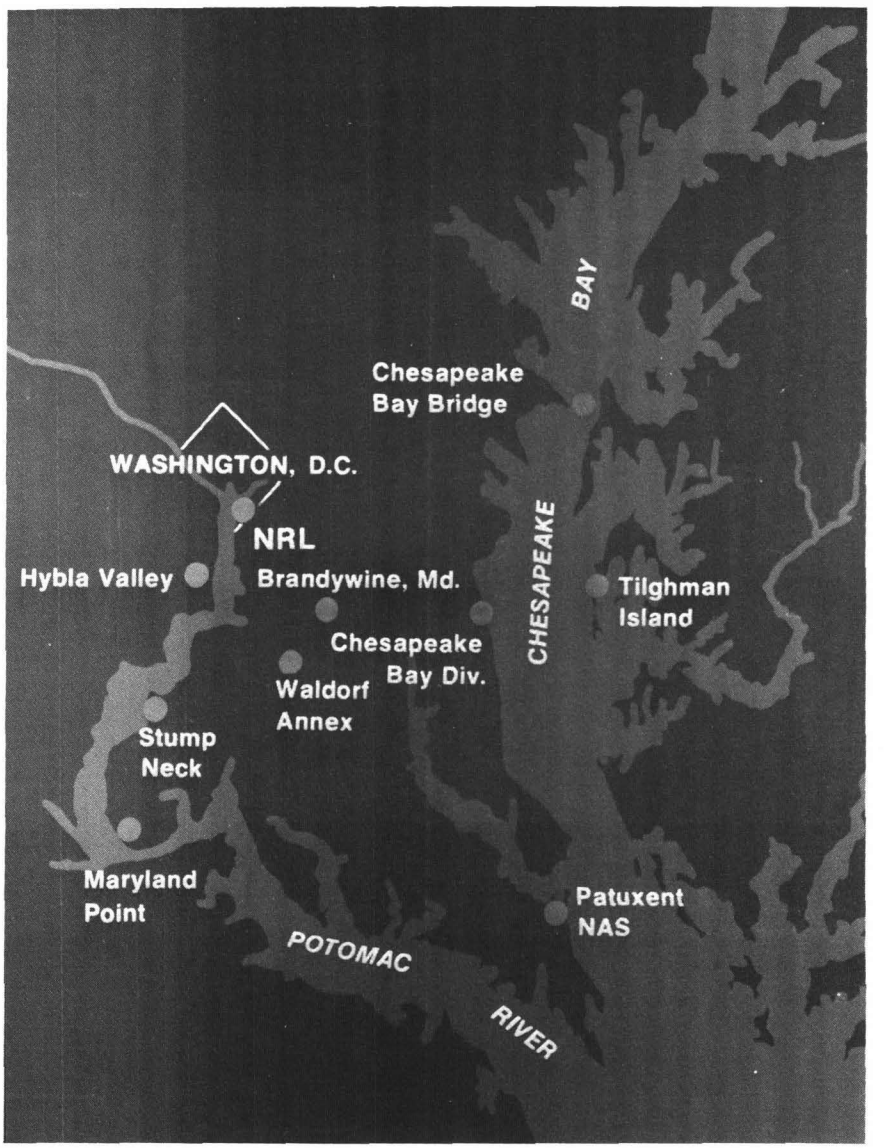


General development plan

DETAILED LISTING OF NRL SITES AND FACILITIES

July 31, 1969

Station and Location	Acreage			Class I & II Plant Account	
	Fee Title	Easement or Purchase	Permit or Lease	Value	No. of Buildings and Structures
Naval Research Laboratory, Washington, D.C.	129.23		1.29	48,529,886	152
Radio Research Site, Blue Plains, D.C.			0.30	1,900	
Cyclotron Building Site Bolling Air Force Base, D.C.			5.24	3,541,773	1
Radio Research Site Coast Guard Radio Station, Alexandria, Va.			55.40		
Radio Test Area, Hybla Valley, Va.	1,262.46			60,000	
A&A Test Site, Shenandoah National Park Luray, Va.			NA		
Chesapeake Bay Division, Chesapeake Beach, Md.	174.90			10,078,654	183
Multiple Research Site, Tilghman Island, Md.	2.00			109,972	9
Dock Facility, Chesapeake Bay, Md.			0.60	13,505	3
Theodolite Station, North Beach, Md.			0.29	800	1
John Hyde Quarry Site, Westminister, Md.			15.25		
Tunnel under Maryland State Road 261			NA		
Optics Research Platform in the Chesapeake Bay, Md.			0.23	1,500	2
2 Foghorn Platforms, Chesapeake Bay Bridge, Md.			NA		
Research Gondola, Chesapeake Bay Bridge, Md.			NA		
NRL Waldorf Annex, Md.	23.94	35.16		1,210,410	35
Radio Astronomy Observatory, Maryland Point, Md.	24.30		200.00	239,027	12
Radio Antenna Range, USAF Receiver Site, Brandywine, Md.			22.98		
Metallurgy and Radio Research Site, Stump Neck Annex, Naval Ordnance Station, Indian Head, Md.			5.90		
Free Space Antenna Range, Pomonkey, Md.	14.12	30.25		736,658	12
Navy Radio Research Station Sugar Grove, West Va.				74,091	2
Satellite Tracking Facility, Blossom Point, Md.			23.00		
Satellite Tracking Station, Roma, Texas	27.84	1.00		725,239	5
Satellite Tracking Station, Raymondville, Texas	171.55	2.85		1,215,770	16
Underwater Sound Reference Division, Orlando, Fla.	10.46			1,196,385	32
USRD, Leesburg Facility, Bugg Spring, Fla.			6.92	167,067	7
Marine Corrosion Laboratory, Key West, Fla.			NA		
Underwater Track Facility Argus Island (near Bermuda)			NA		
Totals:	1,840.80	69.26	337.40	67,900,737	



Location of the principal field stations. Others are at Sugar Grove, W.Va., and on Lake Seneca, N.Y. (near Dresden). The Underwater Sound Reference Division is located at Orlando, Fla.

RESEARCH PLATFORMS

Aircraft

1. The S2D (BUNO 149240) contains specially installed equipment and wing-mounted pods for cloud physics research. Also used in chaff research and for short-term experiments compatible with space limitations of the aircraft.

2. The EC-121K (BUNO 128324) used mainly for wave propagation studies in the four-frequency radar system.

3. The EC-121K (BUNO 135753) used for research in cloud physics, ECM studies, low-frequency radar, and other projects requiring only minimal aircraft conversion.

4. The EC-121K (BUNO 141297) used for radar and VLF propagation studies. Equipment may be installed for other projects.

Available Ships

1. USNS GIBBS (T-AGOR-1)
2. USNS MIZAR (T-AGOR-11)

Under operational control of MSTSLANT, scheduled by NRL

3. USNS MISSION CAPISTRANO T-AG-162) under operational control of MSTSLANT. Scheduled by NRL for use in ONR supported projects. Former tanker modified to accommodate a high-powered sonar transducer, approximately five stories high and weighing hundreds of tons, which was installed by lowering through center well.

4. SSX-1 used mainly for oceanographic research, scheduled by NRL.

5. Other surface vessels and submarines occasionally scheduled for NRL use by OPTEVFOR.

THE NAVY'S CORPORATE LABORATORY

The Naval Research Laboratory is one of the principal in-house research and development institutions of the U.S. Government. It was established in 1923 to ensure that advancements in science and engineering could be readily applied to the Navy's needs. Directed always toward this end, the NRL research program has developed to its present status as a broadly based and coordinated effort in the physical, mathematical, and environmental sciences, in advanced engineering, and in naval analysis. The work of the Laboratory is conducted at the main establishment in the District of Columbia and at various field sites that provide unique environment and facilities not available at the main site.

Some principal elements of the research program include fundamental and applied work in radio wave propagation, oceanography, deep-sea instrumentation, submarine air purification, structural design theory, fracture mechanics, surface chemistry, optical physics, radar, underwater sound propagation, acoustic signal processing, sonar transducers, nuclear physics, radio astronomy, high-temperature lubricants, high-energy fuels, plasma physics, refractory metals, exotic materials for high-performance structures, x-ray astronomy, high-power lasers, solid-state physics, and stress-corrosion cracking of high-strength titanium steels and aluminum alloys. The NRL FY 1970 Program Budget is $100 million.

Some 1100 scientific and technical papers were produced in 1968 as a consequence of the research and development effort of the Laboratory staff. The figure includes 171 formal reports, 95 memorandum reports, 362 articles published in professional society journals, and 490 papers presented at scientific and technical meetings in the United States and in foreign countries (e.g., Austria, Belgium, England, Canada, Czechoslovakia, France, Japan, Switzerland, and Russia).

In addition, 71 U.S. Patents were issued in 1968 on inventions made by present and former employees of the Naval Research Laboratory. This figure brings the grand total of NRL patents, through the calendar year 1968, to 2110.

In its investigations of broad scientific areas, in considering its findings for potential military applications, and in furnishing to the Naval Systems Commands and Secretariat expert consultative services relating to science and military systems, NRL functions as the corporate laboratory of the Navy. Thus it provides a central focus of research and development activity that supports the Navy. When NRL findings and capabilities have borne fruit in particular areas, the results are made known to and used by not only the Navy but also the Army, the Air Force, the Advanced Research Projects Agency, the Atomic Energy Commission, and other agencies of the government.

MISSION

The mission of the Naval Research Laboratory is to conduct scientific research and development in the physical sciences and related fields directed toward new and improved materials, equipment, techniques, and systems for the Navy. In fulfillment of this mission, the Naval Research Laboratory:

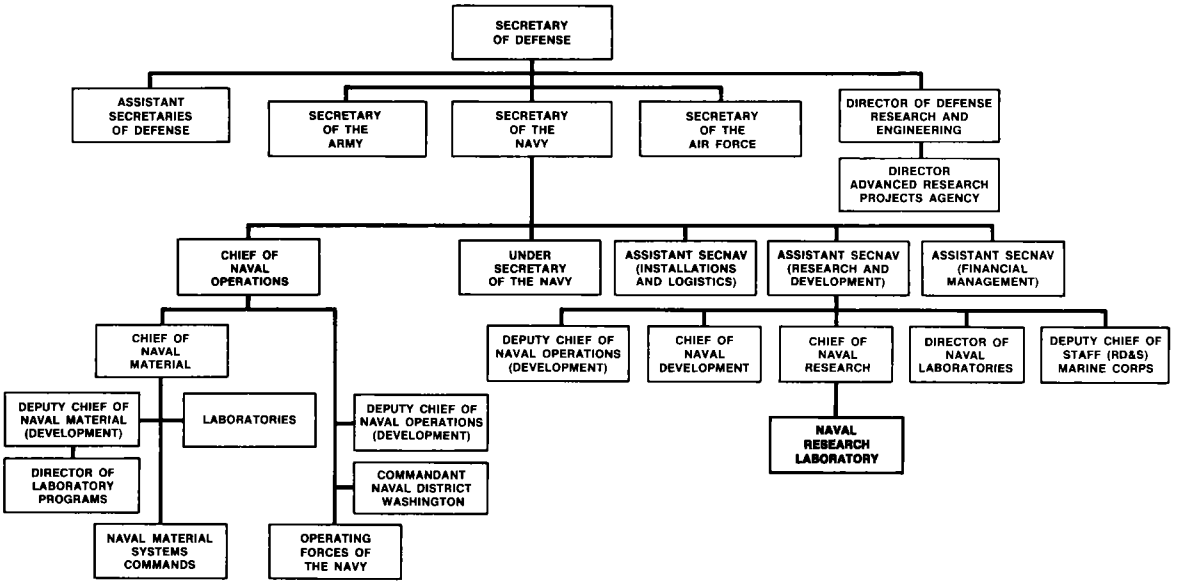
1. Initiates and conducts scientific research and development of a basic and long-range nature in scientific areas of special interest to the Navy.

2. Performs scientific research and development for the Systems Commands and offices of the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.

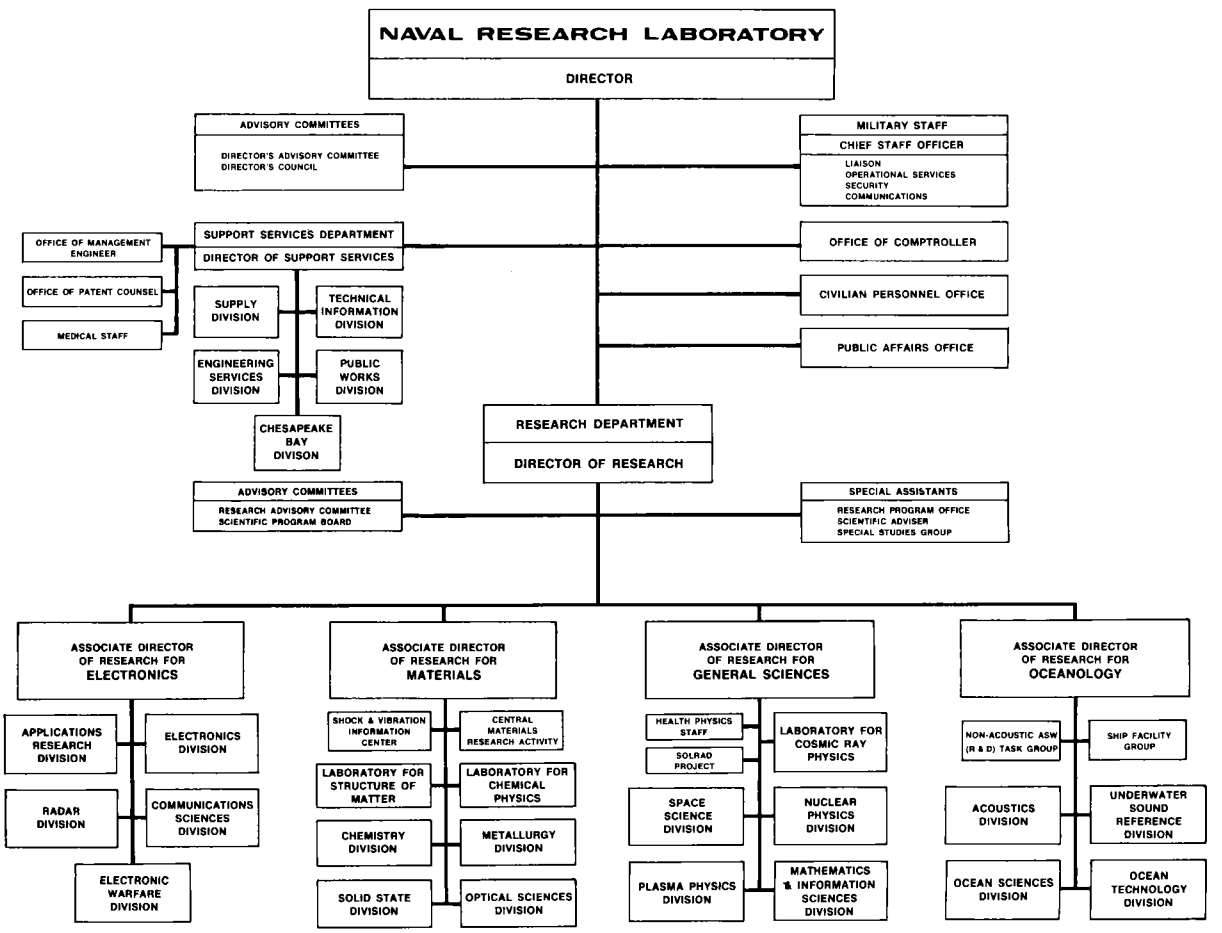
3. Provides to the Navy and its contractors standardized techniques and procedures for measurements and for the accurate calibration of standard instruments in areas of special Navy needs.

4. Furnishes scientific consultative services for the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.

5. Provides to the Navy unbiased determination of performance characteristics of developmental and prototype devices through limited engineering test and evaluation services.



Position of NRL in the Department of Defense structure



Organization chart of NRL

FISCAL INFORMATION

NRL FUNDING BY MAJOR SPONSOR

FISCAL YEARS 1968-1970

Sponsor	FY 1968 (Act)		FY 1969 (Est)		FY 1970 (Est)	
	Millions of Dollars	Percent	Millions of Dollars	Percent	Millions of Dollars	Percent
R&D PROGRAM						
ONR	28.7	30.7	29.7	29.3	34.3	32.9
SHIP	13.0	13.9	15.5	15.3	12.9	12.4
ELEX	5.1	5.5	5.5	5.4	5.9	5.7
AIR	15.7	16.8	12.7	12.5	13.3	12.8
ORD	0.5	0.6	0.7	0.7	1.4	1.3
OTHER NAVY	1.7	1.8	5.4	5.3	5.4	5.2
TOTAL NAVY	64.7	69.3	69.5	68.5	73.2	70.3
OTHER DOD	14.6	15.6	16.3	16.0	16.4	15.7
NON-DOD	11.2	12.0	12.5	12.3	10.9	10.5
TOTAL R&D	90.5	96.9	98.3	96.8	100.5	96.5
NON R&D	1.4	1.5	1.8	1.8	1.6	1.5
TOTAL NIF	91.9	98.4	100.1	98.6	102.1	98.0
CAPITAL IMPROVEMENT	1.5	1.6	1.4	1.4	2.1	2.0
TOTAL FUNDS	93.4	100.0	101.5	100.0	104.2	100.0

OPERATING COSTS
(Excluding Plant Account Funds)
FY 1969 - 1970

Purpose	During FY 1969	During FY 1970
Materials, supplies and parts	$ 10,837,455	$ 10,900,000
Salaries and wages	46,250,513	49,810,000
Contractural services and other costs	44,193,615	38,735,400
TOTAL	$101,281,583	$ 99,445,400

CAPITAL PROPERTY

	As of June 30, 1969
Class 1 (Land)	$ 451,989
Class 2 (Buildings and improvements)	67,443,603
Class 3 (Equipment)	13,158,453
Class 4 (Industrial production equipment)	9,694,738
TOTAL CAPITAL PROPERTY	$90,748,783

MILITARY AND CIVILIAN PERSONNEL

Military Personnel Attached to NRL as of July 31, 1969

Officers	*Authorized*	*On Board*
Captain	3	3
Commander	9	5
Lieutenant Commander	11	3
Lieutenant	9	9
Lieutenant (Junior Grade)	0	3
Ensign	0	2
Warrant Officer	1	0
Total	33	25
Enlisted	66	66

Civilian Employees on Rolls as of July 31, 1969

10 USC 1581 (formerly Public Law 313)		25
Classification Act (GS)		2673
Scientific & Professional	1256	
Technical Supporting	686	
General Administrative & Clerical	731	
Wage Board		869
General Wage Service (WG)	670	
Apprentices, Planning, Estimating, etc. (WD)	101	
Printing & Lithographic Service (WI)	17	
Supervisory General Wage Service (WS)	62	
Inspection Service (WX)	9	
Leader (WL)	1	
Total		3567

Annual Civilian Turnover Rate (percent)

	1967	1968	1969*
Research Department	9.2	13.7	5.0
Nonresearch Areas	15.5	19.9	10.8
Entire Laboratory	12.3	16.8	7.5

Highest Academic Degrees Held by Permanent Employees

Bachelors	731
Masters	297
Doctors	279

*Period 8-1-68 to 7-31-69.

AWARDS RECEIVED BY CIVILIAN EMPLOYEES
As of July 31, 1969

Government Awards	Number
The Medal of Merit from the President of the United States	1
The Certificate of Merit from the President of the United States	11
National Medal of Science from the President of the United States	1
The President's Award for Distinguished Federal Civilian Service	2
Department of Defense Distinguished Civilian Service Award	4
Department of Defense Certificate of Merit	1
Department of the Navy Award for Distinguished Achievement in Science	2
Navy Distinguished Civilian Service Award	53
Navy Captain Robert Dexter Conrad Award	3
Navy Superior Civilian Service Award (established 1959)	24
Navy Meritorious Civilian Service Award	187
E. O. Hulburt Annual Science Award (local NRL award)	14
Non-Government Awards	
Henry Draper Medal of the National Academy of Sciences	1
Engineering Science Award of the Washington Academy of Sciences	2
Physical Sciences Award of the Washington Academy of Sciences	4
Morris Liebmann Memorial Prize of the Institute of Radio Engineers	1
Medal of Merit Award of the Institute of Radio Engineers	2
Harry Diamond Award of the Institute of Radio Engineers	4
John Scott Medal of the City of Philadelphia	1
Patrons Award of the Institute of Radio Engineers (Washington section)	1
Reliability and Quality Control Award of the Radio Engineers Professional Group	1
Frederic Ives Award of the Optical Society of America	2
A. G. Bissel Memorial Award of the American Welding Society	1
Joseph S. Seaman Gold Medal Award of the American Foundrymen's Society	1
John A. Penton Gold Medal Award of the American Foundrymen's Society	1
Eisenman Medal of the American Society for Metals (Philadelphia Chapter)	1
Burgess Prize Award of the American Society for Metals	2
Burgess Memorial Lecture of the American Society for Metals (Wash. Section)	1
Charles B. Dudley Medal of the American Society for Testing Materials	1
Sam Tour Award of the American Society for Testing Materials	1
Gold Medal Award of the American Society of Naval Engineers	2
Trent-Crede Award of the Acoustical Society of America	1
Stuart Ballantine Medal of the Franklin Institute of Pennsylvania	1
A. K. Doolittle Award of the National American Chemical Society	1

Non-Government Awards (Continued)	Number
Kendall Company Award of the American Chemical Society	1
Hillebrand Prize of the American Chemical Society	1
William Blum Award of the Washington-Baltimore Electrochemical Society	1
National Award of the American Society of Lubrication Engineers	1
Annual Award of the Society for Applied Spectroscopy	2
E. Edward Pendray Award of the American Rocket Society	1
James H. Wyld Memorial Award of the American Rocket Society	1
Space Science Award of the American Institute of Aeronautics and Astronautics	1
Eddington Medal of the Royal Astronomical Society (Great Britain)	1
Janssen Medal of the French Photographic Society	1
Ancel Prize of the French Photographic Society	1
Progress Award of the Photographic Society of America	1
Professional Achievement Award of the D. C. Council of Engineers and Architectural Studies	1
National Capital Award of the D. C. Council of Engineers and Architectural Studies	3
Award for Technical Achievement of the American Society of Mechanical Engineers	1
Service to Mankind Award of the Washington Sertoma Club	1
Pittsburgh Spectroscopy Award of the Spectroscopy Society of Pittsburgh	1
Pure Science Award of the Scientific Research Society of America (NRL Branch)	15
Applied Science Award of the Scientific Research Society of America (NRL Branch)	15
Arthur S. Fleming Award of the Washington Chamber of Commerce	2
Society of Women Engineers Achievement Award	1
Notre Dame Centennial of Science Award	2
M. Barry Carlton Award - Institute of Electrical and Electronics Engineers	1
National Civil Service League Merit Citation	1
Brazilian Ordem do Merito Naval (Legion of Naval Merit) Cavaleiro	1

Part 2
Office of the Director

JAMES C. MATHESON

CAPTAIN, USN

Captain Matheson [redacted], in Oconomowoc, Wisconsin. He attended the University of Chicago from 1939 to 1941 and was graduated from the United States Naval Academy in 1944. He holds degrees in naval architecture and nuclear engineering from the Massachusetts Institute of Technology and has completed the Advanced Management Program at the Harvard School of Business Administration.

Captain Matheson is an Engineering Duty Officer. He is qualified in submarines and served aboard the DACE in the Pacific during World War II and the MEDREGAL in the Atlantic subsequent to the war. He has held positions at the Portsmouth Naval Shipyard, at the Bureau of Ships, and with the Atomic Energy Commission as Chief of the West Milton Site of the Knolls Atomic Power Laboratory. From 1961 to 1965 he served as the Nuclear Power Superintendent at the Mare Island Naval Shipyard. He reported to the Naval Research Laboratory as Director of Support Services in October 1965 and assumed the position of Director of the Laboratory on May 29, 1967.

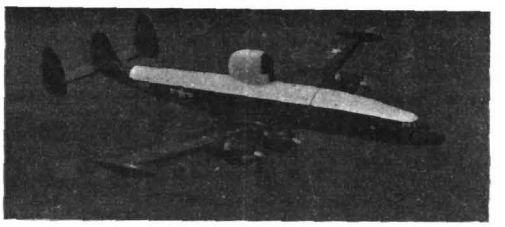
He is a member of the Society of Naval Engineers, the Research Society of America, and the Philosophical Society of Washington.

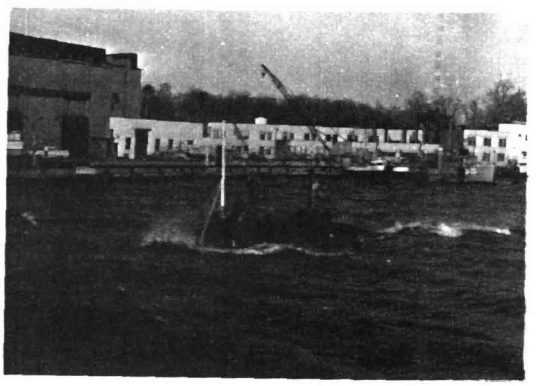
Captain James C. Matheson, USN
Director, Naval Research Laboratory

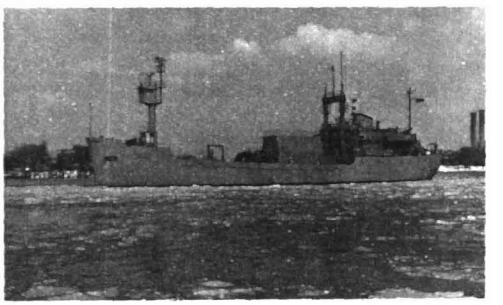
Military Staff Office

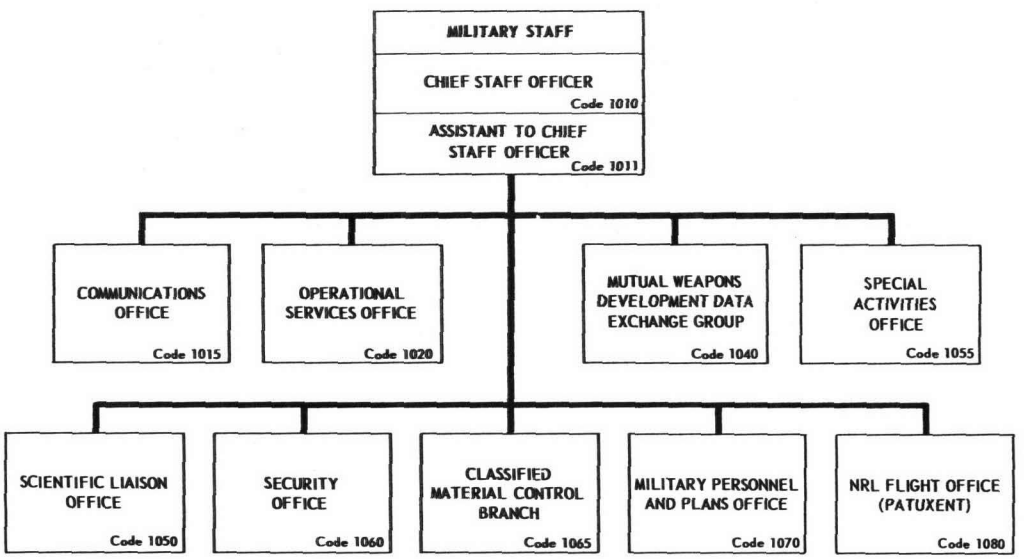
CAPT R. M. Davis, USN

- MILITARY PERSONNEL
- MILITARY PLANS
- MUTUAL WEAPONS DEVELOPMENT DATA EXCHANGE
- OPERATIONAL SERVICES
- SCIENTIFIC LIAISON
- SECURITY
- COMMUNICATIONS









Basic Responsibilities

The Military Staff maintains liaison with the systems commands and offices of the Navy Department, with other units of the Naval establishment ashore and afloat, and with other governmental and nongovernmental agencies concerned with the coordination of military application of the scientific work of the Laboratory. It supports four multi-engine Laboratory aircraft and obtains and coordinates such additional air, surface, and subsurface services as are required. The Military Staff is also responsible for personnel and plant security, communications, and control of classified material.

Key Personnel

Name	*Title*
CAPT R. M. Davis, USN	Chief Staff Officer
CDR L.R. Marshall, USN	Assistant to the Chief Staff Officer
LT D.W. Harold, USN	Communications Officer
CDR M. R. Kalnitzky, USN	Operational Services Officer
Mr. F. W. Shannon	Head, Mutual Weapons Development Data Exchange Group
CDR W.E. Heyl, USN	Scientific Liaison Officer
Mr. W. C. Bryan	Head, Special Activities Office
Mr. C. J. Dryer	Head, Security Branch
Mr. J. J. Bagley	Classified Material Control Officer
LT N. K. Matheson, USN	Military Personnel and Plans Officer
LCDR F. C. Nelson, USN	Head, NRL Flight Office (Patuxent)

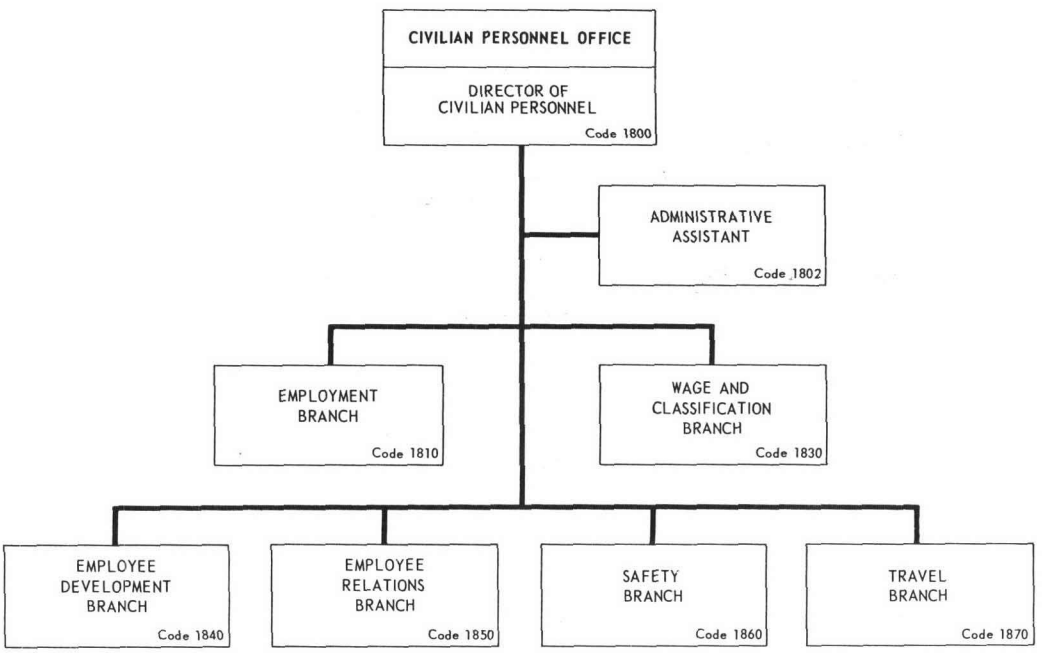
Personnel Complement

On Board: 158
(85 Civilian, 73 Military)

Mr. A. G. Gross

Civilian Personnel Office

- EMPLOYMENT
- WAGE AND CLASSIFICATION
- EMPLOYEE DEVELOPMENT
- EMPLOYEE RELATIONS
- SAFETY
- TRAVEL



Basic Responsibilities

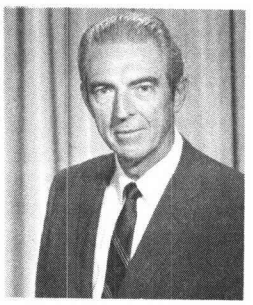
The Civilian Personnel Office administers the Laboratory's personnel program, which provides for the selection, development, promotion, utilization, appropriate recognition, travel, and safety of all civilian personnel. It is also responsible for the establishment and review of all Classification Act and ungraded positions.

Key Personnel

Name	*Title*
Mr. A. G. Gross	Director of Civilian Personnel
Mr. J. E. Goss	Head, Employment Branch
Mr. K. R. Harper	Head, Wage and Classification Branch
Mr. W. J. McLaughlin	Head, Employee Development Branch
Mr. H. H. Kay	Head, Employee Relations Branch
Dr. R. G. Nebelung	Head, Safety Branch
Mrs. B. E. Michaud	Head, Travel Branch

Personnel Complement

On Board: 53



Office of the Comptroller

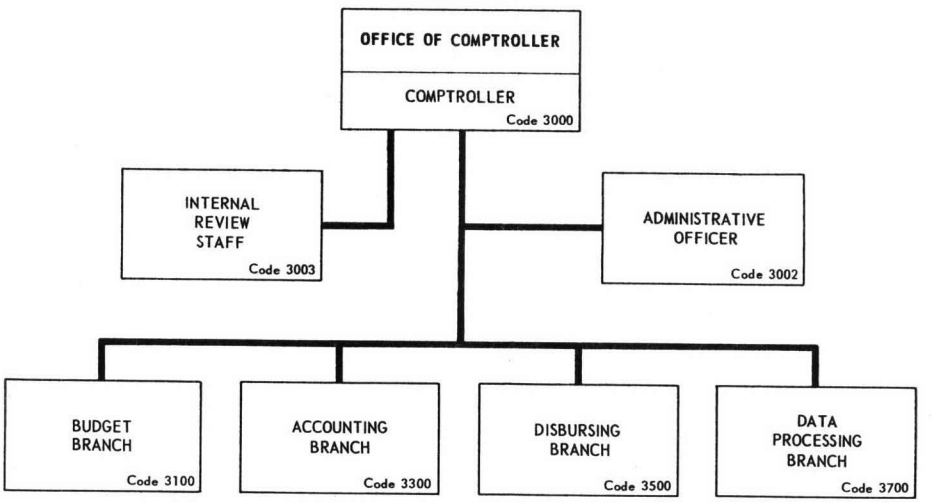
Mr. J. P. Donovan

DISBURSING

BUDGET OFFICE

COMPUTER

- BUDGET
- ACCOUNTING
- DISBURSING
- DATA PROCESSING



Basic Responsibilities

The Comptroller is the financial adviser to the Director and other officials of the Laboratory. He administers the financial program of the Laboratory.

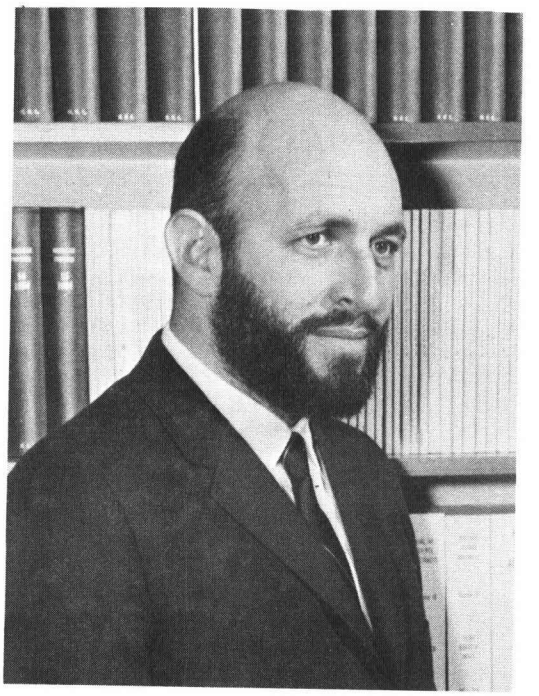
Key Personnel

Name	*Title*
Mr. J. P. Donovan	Comptroller
Mr. W. S. Slater	Budget Officer
Mr. R. A. Showman	Accounting Officer
LT C. R. Grant, SC, USNR	Disbursing Officer
Mr. D. A. Staudt	Data Processing Officer
Mr. D. K. Jones	Head, Internal Review Staff

Personnel Complement

On Board: 70

Part 3
The Research Department



Dr. Alan Berman
Director of Research

Dr. Berman [redacted]. He received the A.B. degree in physics from Columbia College in 1947 and the Ph.D. degree in physics from Columbia University in 1952.

From 1952 to 1955 he was a research scientist at the Hudson Laboratories of Columbia University. He became Assistant Director of Hudson Laboratories in 1955, Associate Director in 1957, and Director in 1963. On May 29, 1967, Dr. Berman became Director of Research for the Naval Research Laboratory.

Dr. Berman's research specialties include the areas of underwater acoustics, oceanography, and signal processing. He has published numerous papers on these and related subjects. At present he is a member or chairman of a wide variety of Navy and oceanographic advisory groups. He also provides advisory services for a number of Department of Defense and other Government agencies.

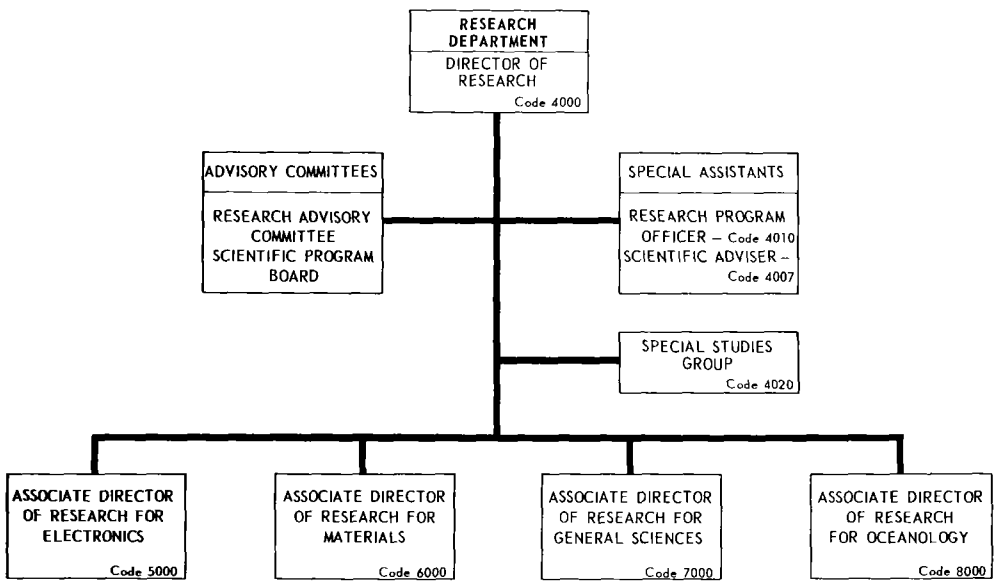
Dr. Berman has on three occasions been visiting scientist to the Admiralty Research Laboratory, Teddington, England (1955, 1957, 1960), and once at the SACLANT ASW Research Center, La Spezia, Italy (1960).

THE RESEARCH DEPARTMENT

The Research Department is headed by a distinguished civilian scientist and administrator. The research effort is divided into four major fields—electronics, materials, general sciences, and oceanology—which correspond to the principal areas of the Navy's interest in the physical and engineering sciences. There is an associate director of research for each of these four broad areas. Sixteen scientific divisions, each headed by a civilian scientist, pursue work in specific fields. Branches within these divisions form interrelated working units.

Key Personnel

Name	Title	Code
Dr. A. Berman	Director of Research	4000
Dr. P. Waterman	Special Assistant	4008
Mr. A. Hollings	Research Program Office	4010
Mr. C. L. Tipton	Special Studies Group	4020
Dr. W. R. Faust	Associate Director of Research for Electronics (Acting)	5000
Dr. J. H. Schulman	Associate Director of Research for Materials	6000
Dr. W. C. Hall	Associate Director of Research for General Sciences	7000
Dr. R. R. Goodman	Associate Director of Research for Oceanology	8000



RESEARCH PROGRAM OFFICE

Basic Responsibilities

The Research Program Office serves as staff to the research directorate of the Laboratory. It provides an orderly plan for coordinating NRL research programs with those of ONR and other sponsors or potential sponsors throughout the Departments of the Navy, the Army, and the Air Force, the Advanced Research Projects Agency, and other agencies of the government. It also serves as a focal point for program information for project managers and other key personnel of sponsoring activities on work in progress or in various stages of planning. The Research Program Office maintains a management information center which serves as a working tool for the Laboratory directorate, and it maintains appropriate records of the Laboratory's research programs.

Key Personnel

Name	*Title*
Mr. A. J. Hollings	Head, Research Program Office
Mr. R. E. Seebold	Deputy Head, Research Program Office
Mr. R. C. Spragg	Head, Management Information Center Section
Mr. R. E. Seebold	Head, Short-Range Program Planning and Appraisal Section
Dr. L. N. Morscher	Staff Assistant—Requirements

Mr. A. J. Hollings

Personnel Complement

On Board: 11

SPECIAL STUDIES GROUP

Basic Responsibilities

The Special Studies Group provides analytical staff support to the Director of Research in the fields of strategic, tactical, and special naval warfare. Programs of operation research and system analysis are undertaken to provide substantive analytical bases for (a) the orientation of naval research and development, and (b) the general delineation of advanced naval weapon systems and force structures requirements for the mid- to long-range time period. Broad scope analyses of projected threats, operations, tactics, equipments, and forces are conducted by four study units–the Operations Analysis; the Systems Analysis; the Systems Applications; and the Amphibious Warfare, respectively.

Key Personnel

Name	*Title*
Mr. C. L. Tipton	Head, Special Studies Group

Mr. C. L. Tipton

Personnel Complement

On Board: 8

Total Estimated R&D Funding

Fiscal Year 1970: $440,000 (Projected)

Electronics Area

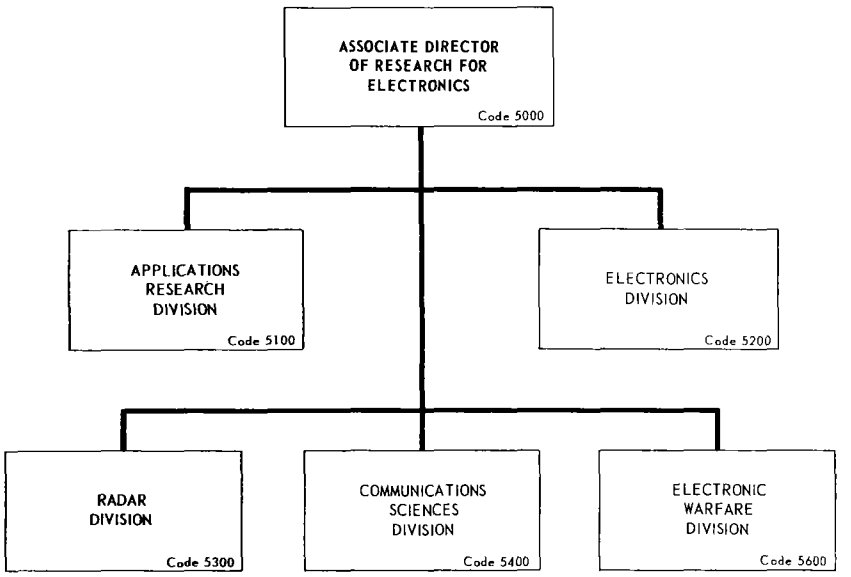
Dr. W. R. Faust
Associate Director of Research for Electronics

Dr. Faust [redacted]. He graduated from Oklahoma State University in 1939 with a B.S. degree in electrical engineering; from the Illinois Institute of Technology in 1941 with an M.S. degree in electrical engineering; and in 1948, he received the Ph.D. degree in physics from the University of Maryland. While studying for his master's degree at Illinois Institute of Technology he worked as a Graduate Assistant (1939-1941).

Dr. Faust joined the Research Department of NRL in 1941 as an electrical engineer in the Radio Division. He transferred to the Nucleonics Division in 1947 as a physicist. Assigned to the Radiation Division in 1950, Dr. Faust continued his work as a physicist for the next five years, during which time he became Acting Head of the Nuclear Reactions Branch and, subsequently, Head of the Analysis and Theory Branch. In 1955, he left NRL to accept a job at Convair, a subsidiary of General Dynamics Corporation, as Chief of Nuclear Research. He returned to NRL in 1956 as Associate Superintendent of the Radiation Division and Head of the Analysis and Theory Branch, positions he held until January 1964 when he was detailed Superintendent of the Applications Research Division. Dr. Faust's appointment in that position became permanent in 1965.

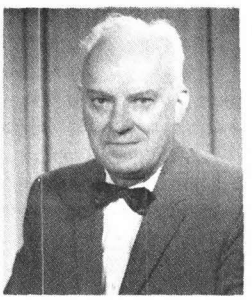
In 1945, Dr. Faust received a Meritorious Civilian Service Award for his "outstanding accomplishments in fundamental design studies in ultra high frequency radar receivers, pursuant to original theoretical investigations into unique types of tube applications." In 1956, he received the Applied Science Award of the NRL Branch of the Research Society of America for his "continuing efforts leading to quantitative knowledge in the field of interaction of radiation with matter, and successful application of this knowledge to the problems of shielding in connection with the testing of nuclear weapons and the development of nuclear power systems." He also received the E. O. Hulburt Award for 1961 "for his theoretical and experimental studies of the multiple scattering of gamma rays and measurements of the production of gamma rays by inelastic neutron collision, which gave a better understanding of nuclear shielding problems and led to the development of new methods of analysis of the interaction of gamma rays and various material; and for his studies leading to a better understanding of certain nuclear weapons phenomena and the behavior of high temperature plasmas which are subjected to magnetic and electromagnetic fields."

Dr. Faust is a Fellow of the American Physical Society of America, a member of the Philosophical Society of Washington, and a member of the Washington Academy of Science. He also holds honorary memberships in Sigma Tau, Eta Kappa Nu, Sigma Pi Sigma, Sigma Xi, and Phi Kappa Phi Societies. Dr. Faust is listed in the American Men of Science and Who's Who in the South, 1961.



Key Personnel

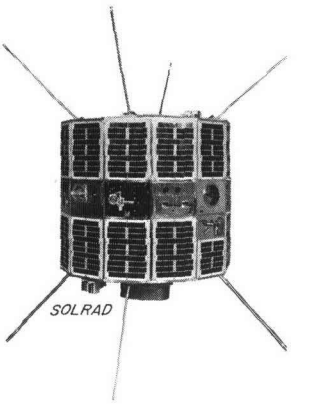
Dr. W. R. Faust	Associate Director of Research for Electronics (Acting)
Dr. L. A. Gebhard	Consultant
Mr. E. F. Kulikowski	Superintendent, Applications Research Division (Acting)
Mr. A. Brodzinsky	Superintendent, Electronics Division
Dr. M. I. Skolnik	Superintendent, Radar Division
Dr. L. B. Wetzel	Superintendent, Communications Sciences Division
Mr. H. O. Lorenzen	Superintendent, Electronic Warfare Division



Mr. E. F. Kulikowski

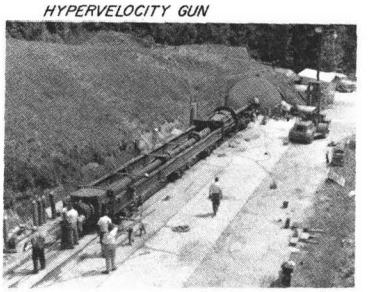
Applications Research Division

- APPLIED PHYSICS
- OPERATIONAL RESEARCH
- SPACE APPLICATIONS
- SATELLITE TECHNIQUES
- DYNAMICS

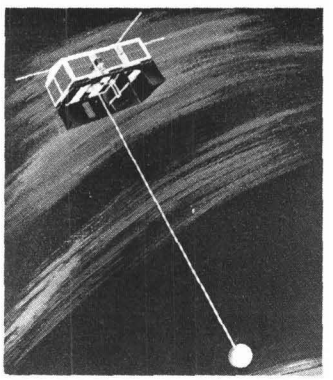


SOLRAD

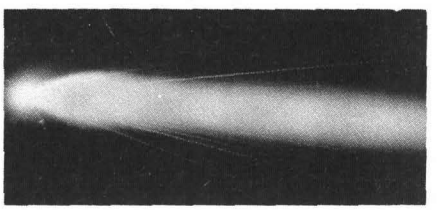
HYPERVELOCITY GUN

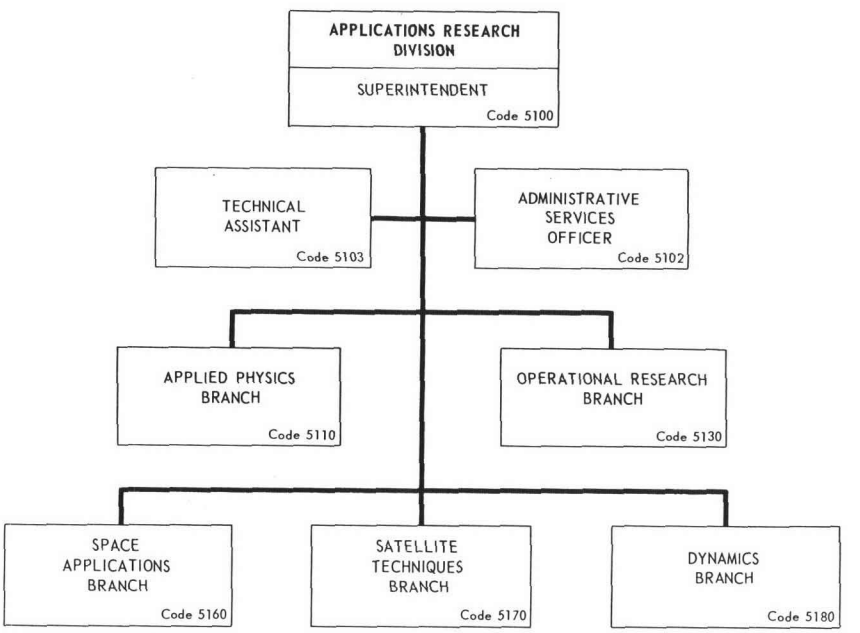


TIMATION



ROCKET PLASMA STUDIES





Basic Responsibilities

The Applications Research Division conducts research and development in the fields of plasma physics, laser systems, defense against ballistic missiles including impact and penetration ballistics, data handling and processing, satellite techniques, and celestial mechanics and navigation. As a result of these studies the Division designs and develops systems (e.g., satellites) and components (e.g., antennas for use in space) as related to such naval requirements as target identification, surveillance, navigation, guidance, and communication and provides for the evaluation of such systems.

Branches

Applied Physics

- Lasers
- Space physics and quantum electronics
- Plasma physics

Operational Research

- Orbit computation and celestial mechanics
- Fire and missile control evaluation instrumentation
- Satellite telemetry automatic data processing

Space Applications

- Navigation satellites
- Profile techniques

Satellite Techniques

- Satellite development
- Gravity gradient stabilization of satellites
- Research satellites, especially solar radiation devices
- Calibration satellites

Dynamics

- Vulnerability mechanics
- Hypervelocity kill mechanisms
- Hypervelocity impact mechanics
- Penetration into earthy materials

Key Personnel

Name	*Title*
Mr. E. F. Kulikowski	Superintendent (Acting)
Mr. E. W. Peterkin	Technical Assistant to Superintendent
Dr. W. S. Ament	Consultant
Mr. D.J. McLaughlin	Head, Applied Physics Branch (Acting)
Mr. C. H. Chrisman	Head, Operational Research Branch
Mr. R. L. Easton	Head, Space Applications Branch
Mr. P. G. Wilhelm	Head, Satellite Techniques Branch
Mr. W. W. Atkins	Head, Dynamics Branch

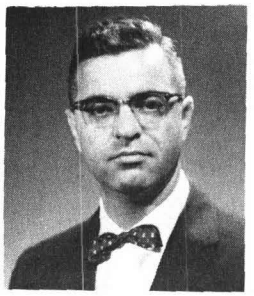
Personnel Complement

On Board: 161

Total Estimated R&D Funding

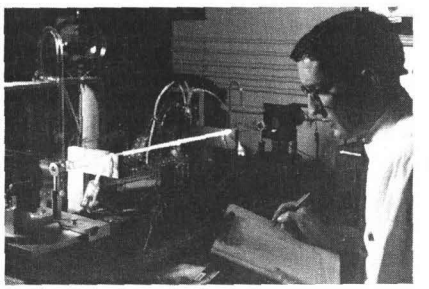
Fiscal Year 1970: $10,448,500

Electronics Division

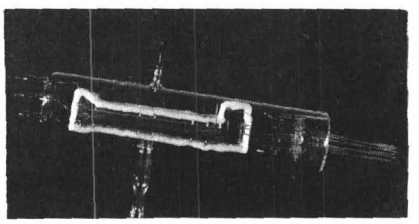


Mr. A. Brodzinsky

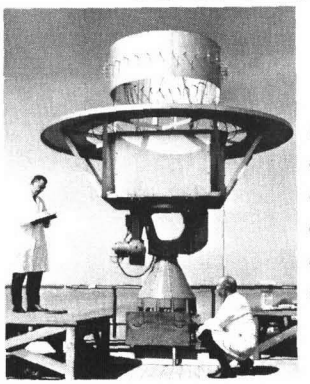
MICRO-CIRCUITRY



GAS LASERS

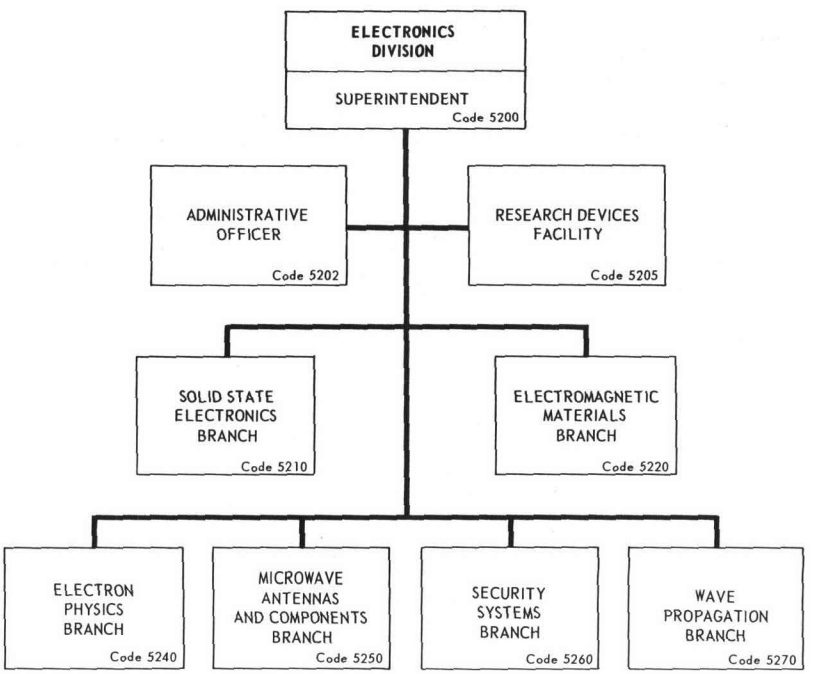


ELECTRON TUBE RESEARCH



ANTENNA RESEARCH

- SOLID STATE ELECTRONICS
- ELECTROMAGNETIC MATERIALS
- ELECTRON PHYSICS
- MICROWAVE ANTENNAS & COMPONENTS
- SECURITY SYSTEMS
- WAVE PROPAGATION



Basic Responsibilities

The Electronics Division carries out programs of basic and applied research and development in the fields of: electronic properties of solid materials; microwave antennas and components; microelectronic technology; electronic identification systems; electromagnetic wave propagation; properties of ground and sea surface radar returns; and vacuum and gaseous electron devices.

Branches

Solid State Electronics

- Semiconductor devices, materials and circuits, both low and microwave frequencies
- Thin films

Electromagnetic Materials

- Electromagnetic wave scattering: (1) from rough liquid surfaces; (2) from small particles
- Development and application of radar protective coatings
- Systems for production, processing, and control of electric power
- Seawater battery development and applications

Electron Physics

- Gas lasers
- Microwave tubes
- Vacuum breakdown
- Surface physics research
- Night vision tubes

Microwave Antennas and Components

- Millimeter wave communication system
- Naval electronic scanning antennas for airborne use
- Advanced microwave antenna research
- Microwave electronic components

Security Systems

- Development of new IFF systems and components
- Development of solid state transmitters at L-band
- Development of IFF decision devices
- Consulting services to AIMS* tri-service program

Wave Propagation

- Properties of ground and sea surface radar echoes
- Radar mapping of terrain
- Target cross section measurements
- Sea surface analysis

*AIMS

A - Air Traffic Control Radar Beacon
I - IFF (Identification Friend or Foe)
M - Mark XII
S - System

Key Personnel

Name	*Title*
Mr. A. Brodzinsky	Superintendent
Mr. T. E. Hanley	Head, Research Devices Facility
Dr. J. Davey	Head, Solid State Electronics Branch (Acting)
Dr. R. W. Wright	Head, Electromagnetic Materials Branch
Dr. S. T. Smith	Head, Electron Physics Branch
Mr. R. Brown	Head, Microwave Antennas and Components Branch (Acting)
Mr. C. V. Parker	Head, Security Systems Branch
Mr. N. W. Guinard	Head, Wave Propagation Branch

Personnel Complement

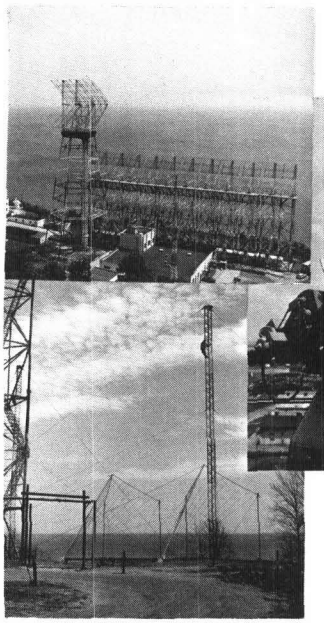
On Board: 138

Total Estimated R&D Funding

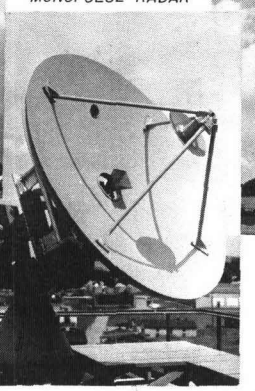
Fiscal Year 1970: $4,553,000

Radar Division

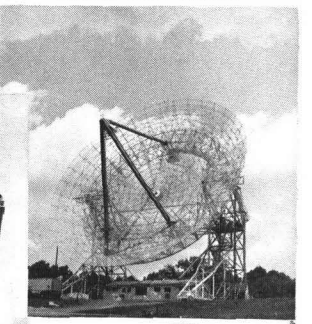
Dr. M. I. Skolnik



HF ADVANCED RESEARCH RADAR

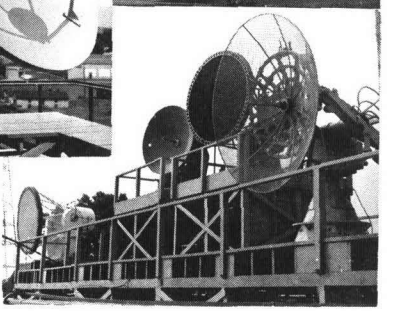


MARK 50 MONOPULSE RADAR



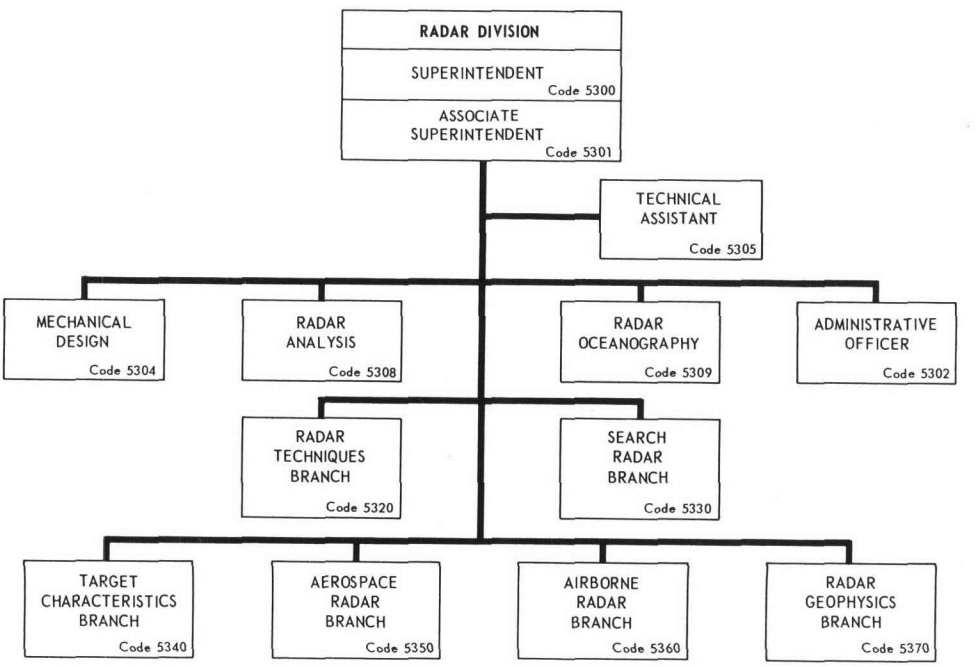
RANDLE CLIFF RADAR

HF SURFACE WAVE ANTENNA



MULTI-BAND EXPERIMENTAL RADAR COMPLEX

- RADAR TECHNIQUES
- SEARCH RADAR
- TARGET CHARACTERISTICS
- AEROSPACE RADAR
- AIRBORNE RADAR
- RADAR GEOPHYSICS



Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analysis and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors which are applicable to enhancing the Navy's ability to fulfill its mission.

Branches

Radar Techniques

- High-frequency radar
- Signal processing

Search Radar

- Phased array techniques
- ASW radar
- Precision tracking radar techniques
- Radar evaluation
- Range instrumentation

Target Characteristics

- Target signature analysis
- Target radar-spectra studies
- Microwave and laser techniques
- Laser sensor systems

Aerospace Radar

- Ocean surveillance

Airborne Radar

- Airborne radar
- Weapons analysis
- ECCM
- Airborne early warning radar
- Moving target indication techniques for ship and airborne radars

Radar Geophysics

- Wave propagation
- Studies of ionosphere by means of radar and satellite transmissions
- Radar measurements of satellites and ballistic missiles

Key Personnel

Name	*Title*
Dr. M. I. Skolnik	Superintendent
Mr. J. H. Dunn	Associate Superintendent
Mr. W. N. Shaddix	Technical Assistant
Mr. S. F. George	Radar Analysis Staff
Mr. I. W. Fuller, Jr.	Radar Oceanography Group
Mr. F. M. Gager	Head, Radar Techniques Branch
Dr. R. J. Adams	Head, Search Radar Branch
Mr. I. D. Olin	Head, Target Characteristics Branch
Mr. R. E. Ellis	Head, Aerospace Radar Branch
Mr. D. L. Ringwalt	Head, Airborne Radar Branch
Mr. L. V. Blake	Head, Radar Geophysics Branch

Personnel Complement

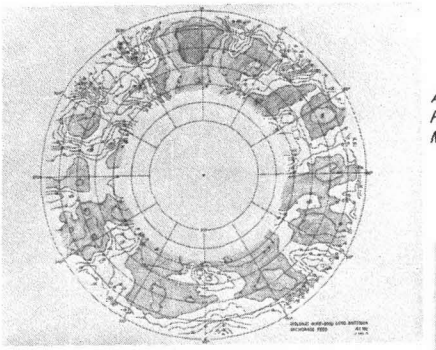
On Board: 175

Total Estimated R&D Funding

Fiscal Year 1970: $7,599,000

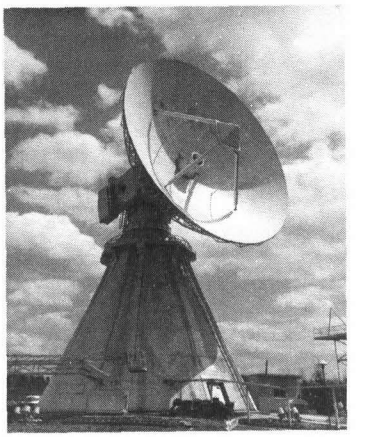
Dr. L. B. Wetzel

Communications Sciences Division

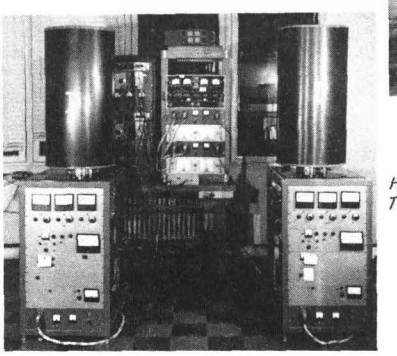


ANTENNA PATTERN MEASUREMENT

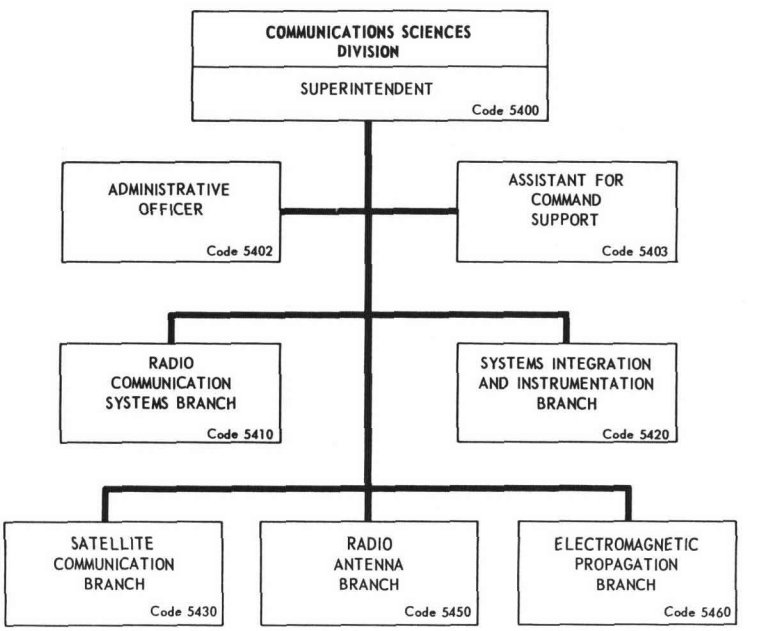
MICROWAVE SPACE RESEARCH FACILITY



- RADIO COMMUNICATION SYSTEMS
- SYSTEMS INTEGRATION AND INSTRUMENTATION
- SATELLITE COMMUNICATION
- RADIO ANTENNA
- ELECTROMAGNETIC PROPAGATION



HYDROGEN MASER TIME STANDARDS



Basic Responsibilities

The Communications Sciences Division conducts research and development in the fields of radio communication systems, satellite communications, integration of electronic systems, precise frequency and time, communication antennas, electromagnetic wave propagation and certain aspects of radio navigation.

Branches

Radio Communication Systems

- Secure communications
- Modem and interface functions
- Crypto-logic systems
- Terminal devices

Systems Integration and Instrumentation

- Precise frequency and time
- Centralized electronic control
- Integrated communication, navigation and identification systems
- Long range aircraft navigation (OMEGA)
- Advanced monitoring & testing techniques

Satellite Communication

- Satellite communication systems
- Precision satellite communication experiments
- Modem studies
- Orbit parameter studies

Radio Antenna

- Communication antenna studies
- Antenna circuitry
- Underwater reception and propagation

Electromagnetic Propagation

- ELF/VLF and LF propagation studies
- Noise measurements and predictions
- Microwave troposcatter
- Effects of propagation on navigational accuracy

Key Personnel

Name	*Title*
Dr. L. B. Wetzel	Superintendent
Mr. R. G. Tuttle	Assistant for Command Support
Mr. C. B. Davis	Head, Radio Communication Systems Branch
Mr. D. I. Himes	Head, Systems Integration and Instrumentation Branch
Mr. J. P. Leiphart	Head, Satellite Communication Branch
Mr. M. L. Musselman	Head, Radio Antenna Branch
Mr. W. E. Garner	Head, Electromagnetic Propagation Branch

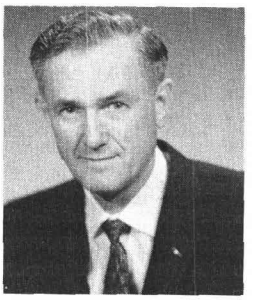
Personnel Complement

On Board: 129

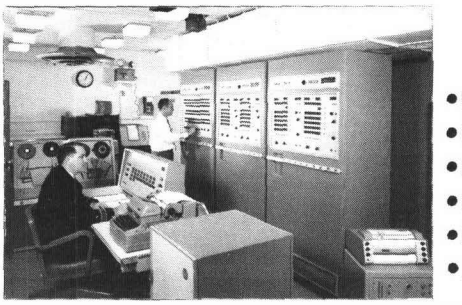
Total Estimated R&D Funding

Fiscal Year 1970: $6,884,000

Electronic Warfare Division

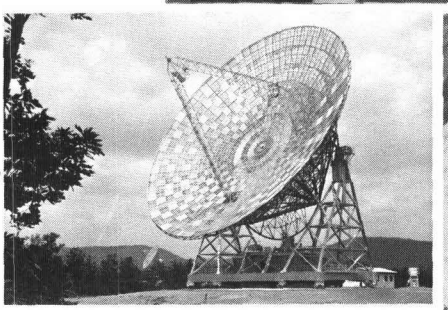


Mr. H. O. Lorenzen

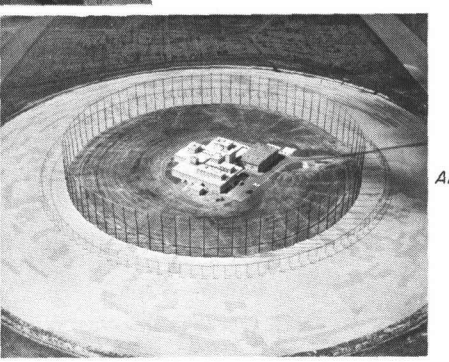


TACTICAL DATA PROCESSING

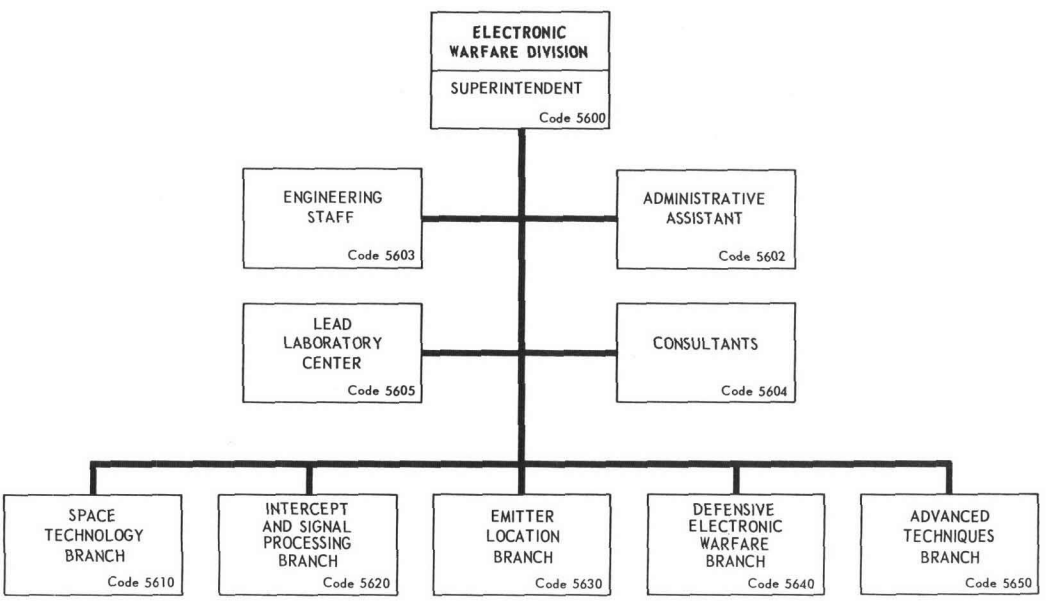
- LEAD LABORATORY / CENTER
- SPACE TECHNOLOGY
- SIGNAL INTERCEPT AND SIGNAL PROCESSING
- EMITTER LOCATION
- DEFENSIVE ELECTRONIC WARFARE
- ADVANCED TECHNIQUES



150 FOOT ANTENNA
Sugar Grove



HF ANTENNA



Basic Responsibilities

The Electronic Warfare Division is responsible for the research and development required in support of the Navy's electronic warfare mission in the fields of space technology, intercept and signal processing, emitter location, and defensive electronic warfare, and has responsibility associated with NRL's designation as Lead Laboratory for Navy in-house exploratory development.

Branches

Space Technology

- Large parabolic antenna systems
- Electromagnetic radiation observation
- Special media propagation
- Electromagnetic exosphere phenomena
- Satellite systems
- National radio quiet zone

Emitter Locations

- Direction finding
- Ionospheric research
- Propagation studies
- Infrared countermeasures
- Large antenna studies

Intercept and Signal Processing

- Interception
- Signal processing
- Data storage
- Data processing
- Recording
- Display

Defensive Electronic Warfare

- Deception techniques
- Jamming
- Electromagnetic reflectors
- Defensive systems

Lead Laboratory Staff

- Navy in-house exploratory development
- Program Reference Center
- Technical studies analysis and consultation
- Advanced Technical Objectives Work Group

Advanced Techniques

- Concept formulation
- New platform and mission considerations
- Signal processing devices
- Advanced detection and identification techniques
- New ECM techniques

Key Personnel

Name	*Title*
Mr. H. O. Lorenzen	Superintendent
CAPT F. Welden, USN (Ret)	Consultant
Mr. W. E. Withrow	Consultant
Dr. G. P. Ohman	Lead Laboratory Coordinator and Head, Lead Laboratory Staff
Mr. J. H. Trexler	Head, Space Technology Branch
Mr. R. D. Misner	Head, Intercept and Signal Processing Branch (Acting)
Mr. M. J. Sheets	Head, Emitter Location Branch
Mr. A. J. Jesswein, Jr.	Head, Defensive Electronic Warfare Branch (Acting)
Mr. L. A. Cosby	Head, Advanced Techniques Branch

Personnel Complement

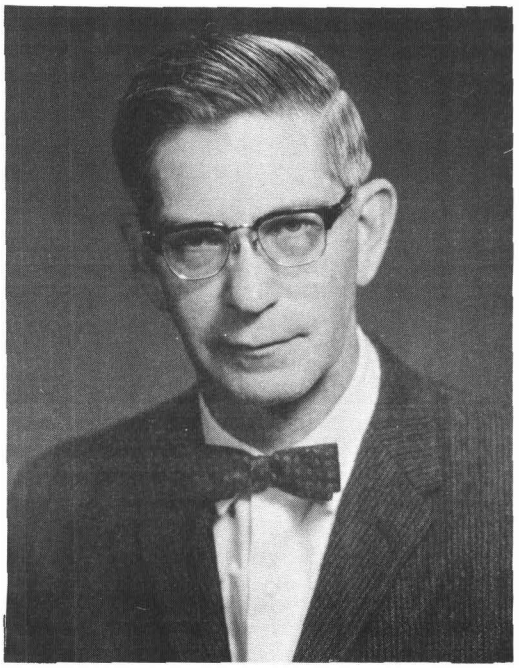
On Board: 128

Graded: 127
Ungraded: 1

Total Estimated R&D Funding

Fiscal Year 1970: $12,631,000

Materials Area



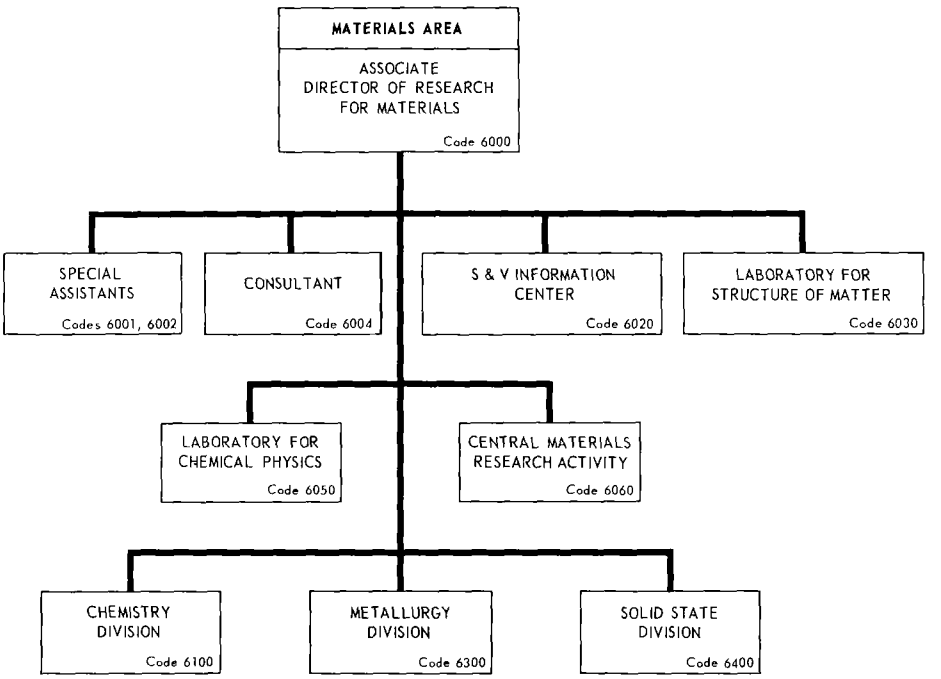
Dr. James H. Schulman
Associate Director of Research for Materials

Dr. Schulman [redacted] He is a graduate of the Massachusetts Institute of Technology, from which he received the B.S. degree in 1939 and the Ph.D. degree in 1942, both in the field of chemistry. While working toward his doctorate he held an instructorship at Suffolk, Boston, and a Teaching Fellowship at M.I.T. In 1941, he joined the staff of the M.I.T. Laboratory for Insulation Research, where he headed a section concerned with selenium rectifiers and photocells.

Dr. Schulman joined the Sylvania research laboratories in 1944 to carry out research on luminescent materials for use in cathode-ray tubes and fluorescent lamps. He came to NRL in 1946 to initiate a research program on luminescence, with particular emphasis on inorganic luminescent materials. At NRL he has served as Head, Chemical Metallurgy Branch, Metallurgy Division; Head, Dielectrics Branch, Solid State Division; Acting Associate Superintendent, Solid State Division; and Superintendent of the former Optical Physics Division. From August 1960 until December 1961, he was Deputy Scientific Director and Liaison Scientist for Solid State Physics with the London Branch of the Office of Naval Research. Upon his return to NRL in November 1964, Dr. Schulman was appointed to the Chair of Materials Sciences in recognition of his distinguished research accomplishments. In September 1967, he was appointed Associate Director of Research for Materials.

Dr. Schulman received the Applied Science Award of the NRL Branch of the Research Society of America (1957) and the Navy Superior Civilian Service Award (1965), both in recognition of his many contributions to the study of solid luminescent materials and phenomena, the investigation of radiation-induced optical effects in solids, and the application of the radiation-sensitive properties of solids to the dosimetry of nuclear and other high-energy radiations.

Dr. Schulman is a member of the Steering Committee of the Solid State Panel of the National Academy of Sciences, a former member of the Visiting Committee of the Argonne National Laboratory, and a former Chairman of the National Academy of Sciences–National Research Council Committee on High-Level Radiation Dosimetry. He is an Associate Editor of the Journal of the Optical Society of America and of the Materials Research Bulletin. Dr. Schulman is a Fellow of the American Physical Society, of the Optical Society of America, and of the American Association for the Advancement of Science. He has written numerous technical papers, coauthored a book in a special area of solid state physics, and been awarded several patents.



Key Personnel

Dr. J. H. Schulman	Associate Director of Research for Materials
Dr. D. A. Patterson	Special Assistant
Dr. H. Gandy	Special Assistant
Dr. R. L. Tuve	Consultant
Dr. W. W. Mutch	Head, S&V Information Center
Dr. J. Karle	Head, Laboratory for Structure of Matter
Dr. W. A. Zisman	Head, Laboratory for Chemical Physics
Mr. R. J. Ginther	Head, Central Materials Research Activity
Dr. R. E. Kagarise	Superintendent, Chemistry Division
Mr. W. S. Pellini	Superintendent, Metallurgy Division
Dr. C. C. Klick	Superintendent, Solid State Division
Dr. H. Rabin	Superintendent, Optical Sciences Division (Acting)

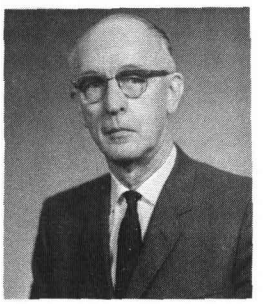
SHOCK & VIBRATION INFORMATION CENTER

Basic Responsibilities

The Shock & Vibration Information Center is one of the information centers established by the Director of Technical Information, DDR&E, and assigned to Navy for management and operation. It provides a single source within the Department of Defense for up-to-date information in the fields of shock and vibration for scientists and engineers in government agencies and for government contractors.

Key Personnel

Name	*Title*
Dr. W. W. Mutch	Head, S&V Information Center



Dr. W. W. Mutch

Personnel Complement

On Board: 5

Total Estimated R&D Funding

Fiscal Year 1970: $280,000

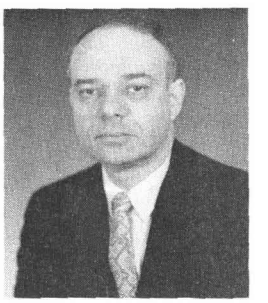
LABORATORY FOR STRUCTURE OF MATTER

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, and crystalline structure of materials. The methods of x-ray and electron diffraction are used in a broad program of structure studies which can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines.

Key Personnel

Name	*Title*
Dr. J. Karle	Head, Laboratory for Structure of Matter



Dr. J. Karle

Personnel Complement

On Board: 12

Total Estimated R&D Funding

Fiscal Year 1970: $555,000

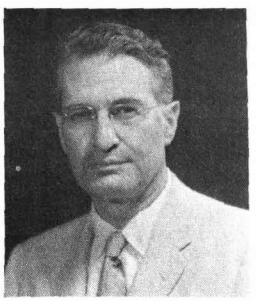
LABORATORY FOR CHEMICAL PHYSICS

Basic Responsibilities

The Laboratory for Chemical Physics carries out an interdisciplinary program of fundamental and applied research with especial emphasis on phenomena occurring at phase boundaries, i.e., the interfaces between solids and solids, solids and liquids, solids and gases, liquids and liquids, and liquids and gases. Currently, attention is being given to adhesion and adhesion promoters, wetting, surface electric properties of metals and plastics, interfacial phenomena in composite materials, the quantitative relation of dry film lubricants to shear strength and its pressure coefficient, the ability of insoluble monolayers to dampen the surface waves in liquids, and the relation of the interfacial tension of two liquids to their solubility.

Key Personnel

Name	*Title*
Dr. W. A. Zisman	Head, Laboratory for Chemical Physics



Dr. W. A. Zisman

Personnel Complement

On Board: 10

Total Estimated R&D Funding

Fiscal Year 1970: $298,000

CENTRAL MATERIALS RESEARCH ACTIVITY

Basic Responsibilities

The responsibilities of the Central Materials Research Activity are twofold: (1) to perform basic and applied research in the preparation and characterization of materials, and (2) to provide consultation or assistance for all laboratory research personnel in the above matters. Special research areas investigated by the staff include glasses, luminescent materials, single crystal, high purity, and rare earth materials. The primary facilities involved in characterization are x-ray diffraction techniques and solid state spark-source mass spectrometry.

Key Personnel

Name	*Title*
Mr. R. J. Ginther	Head, Central Materials Research Activity
Dr. F. L. Carter	Head, Diffraction and Special Materials Section
Dr. M. Krulfeld	Head, Crystals and Pure Materials Section
Mr. R. J. Ginther	Head, Glass and Luminescent Materials Section (Acting)

Mr. R. J. Ginther

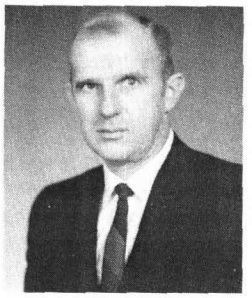
Personnel Complement

On Board: 13

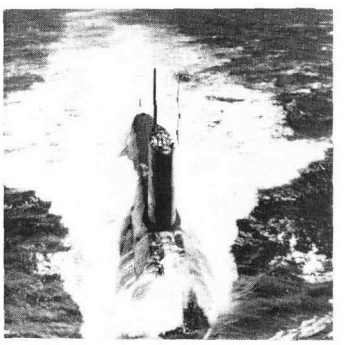
Total Estimated R&D Funding

Fiscal Year 1970: $433,000

Chemistry Division



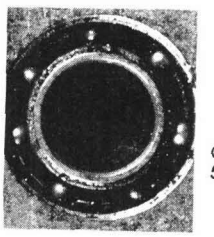
Dr. R. E. Kagarise



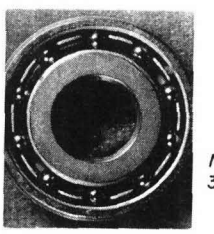
SUBMARINE HABITABILITY

HIGH TEMPERATURE CORROSION

- PHYSICAL CHEMISTRY
- ORGANIC CHEMISTRY
- INORGANIC CHEMISTRY
- PROTECTIVE CHEMISTRY
- ELECTROCHEMISTRY
- SURFACE CHEMISTRY
- CHEMICAL DYNAMICS

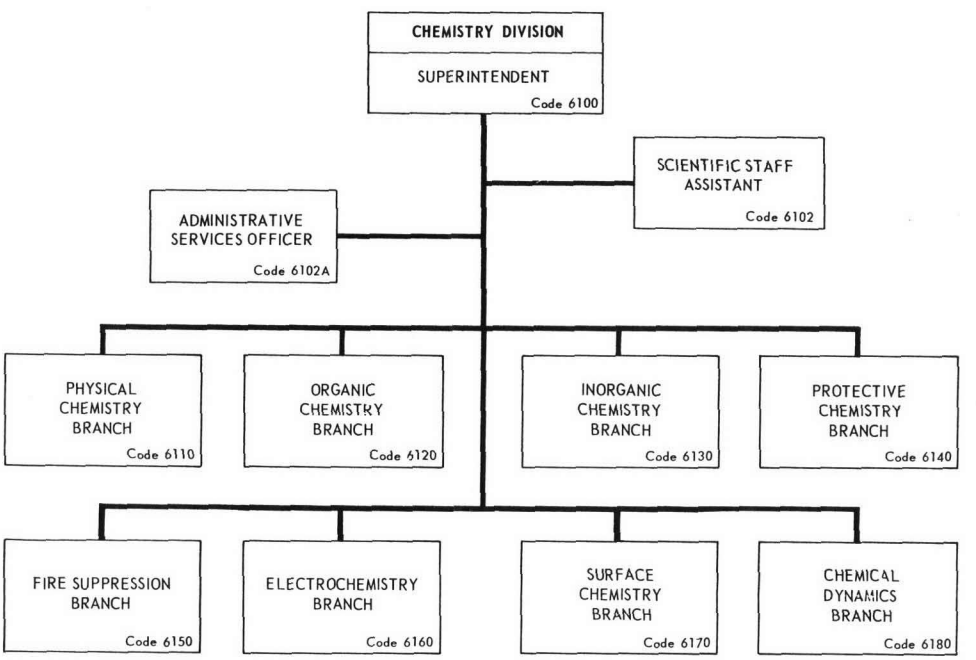


OLD SYSTEM 500 hrs.



NEW SYSTEM 3000 hrs.

BEARING LUBRICANTS



Basic Responsibilities

The Chemistry Division conducts a diversified program of basic and applied research and development in physical, organic, inorganic, and analytical chemistry. Specialized programs within these fields include fuels, lubricants, corrosion, surface chemistry, fire suppression, protective coatings, polymers, electrochemistry, molecular structure, submarine atmosphere purification, and BW/CW personnel protection. Consultative services form an important element in the division effort.

Branches

Physical Chemistry

- Infrared and ultraviolet spectroscopy
- Analytical mass spectrometry
- Nuclear magnetic resonance spectroscopy

Organic Chemistry

- Synthesis and properties of polymers
- Functional organic coatings
- Properties of resins under high compressive loads

Inorganic Chemistry

- Submarine air purification
- Oxygen generating chemicals
- Corrosion mechanisms and kinetics
- Ceramic materials

Protective Chemistry

- CW/BW ship defense
- Adsorbents

Fire Suppression

- Fire suppression agents and techniques for special hazards on board ships and naval shore activities
- Interruption of fire propagation mechanism

Electrochemistry

- Fuel cells
- Fundamental electrode reactions
- Electrochemical power sources

Surface Chemistry

- Lubricants
- Salvage of equipment damaged by sea water
- Surface properties of fibers
- Drag reduction

Chemical Dynamics

- Organic contaminants in submarine atmosphere
- Distillate fuels research
- Autoxidation and combustion dynamics

Key Personnel

Name	*Title*
Dr. R. E. Kagarise	Superintendent
Dr. L. B. Lockhart, Jr.	Head, Physical Chemistry Branch
Dr. A. L. Alexander	Head, Organic Chemistry Branch
Mr. R. R. Miller	Head, Inorganic Chemistry Branch
Dr. E. A. Ramskill	Head, Protective Chemistry Branch
Mr. H. B. Peterson	Head, Fire Suppression Branch (Acting)
Dr. J. C. White	Head, Electrochemistry Branch
Dr. N. L. Jarvis	Head, Surface Chemistry Branch
Dr. H. W. Carhart	Head, Chemical Dynamics Branch

Personnel Complement

On Board: 127

Total Estimated R&D Funding

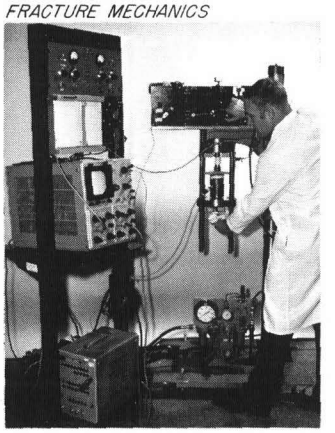
Fiscal Year 1970: $3,739,000

Metallurgy Division

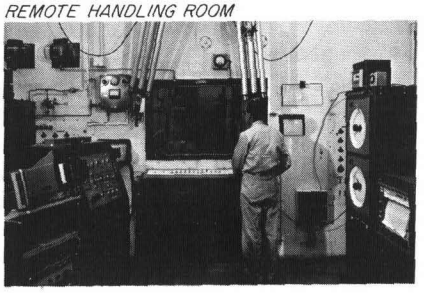
Mr. W. S. Pellini

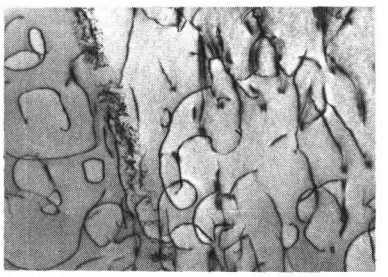
- PHYSICAL METALLURGY
- METAL PHYSICS
- THERMOSTRUCTURAL MATERIALS
- TRANSFORMATIONS AND KINETICS
- STRENGTH OF METALS
- REACTOR MATERIALS

FRACTURE MECHANICS

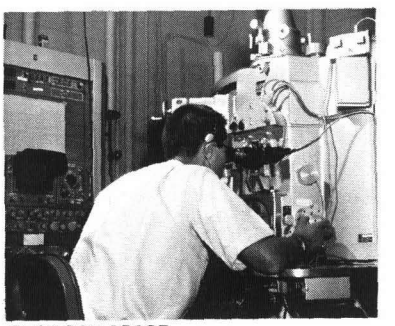


REMOTE HANDLING ROOM

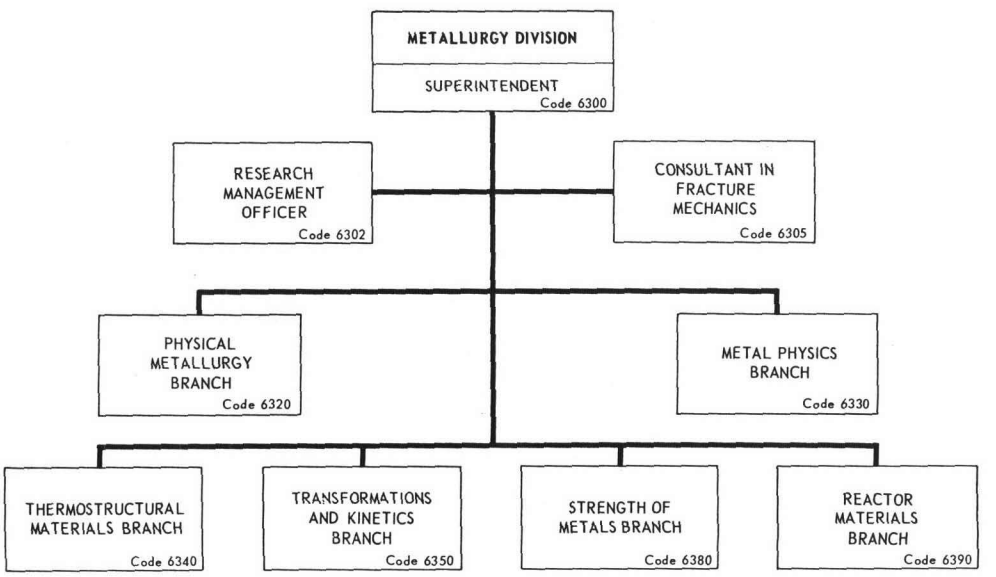




DEFECT STRUCTURES



ELECTRON PROBE



Basic Responsibilities

The Metallurgy Division conducts research, development, and evaluation in the field of metallurgy, including the physical, mechanical, chemical, and structural aspects of metals. Important consultative services are provided to Navy and other DOD activities.

Branches

Physical Metallurgy

- Fractography
- Micromechanical metallurgy
- Marine corrosion studies
- Stress corrosion

Metal Physics

- Electronic properties of metallic materials
- Metallic imperfection studies
- Effects of irradiation upon the solid state properties of metals

Thermostructural Materials

- High-temperature flow and fracture
- Effects of environment on fatigue and creep
- Single crystals of refractory metals
- Composites

Transformations and Kinetics

- Solidification and crystal growth
- Electron microscopy
- Solid-state reactions

Strength of Metals

- Properties, selection criteria, and fracture-safe design parameters for high and ultra-high-strength structural metals

Reactor Materials

- Properties of irradiated structural metals and alloys
- Mechanisms of radiation degradation of metals
- Neutron spectra and dosimetry

Key Personnel

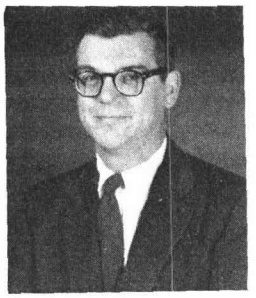
Name	*Title*
Mr. W. S. Pellini	Superintendent
Dr. J. M. Krafft	Consultant
Dr. B. F. Brown	Head, Physical Metallurgy Branch
Dr. A. I. Schindler	Head, Metal Physics Branch
Dr. M. R. Achter	Head, Thermostructural Materials Branch
Dr. M. E. Glicksman	Head, Transformations and Kinetics Branch
Mr. R. J. Goode	Head, Strength of Metals Branch
Mr. L. E. Steele	Head, Reactor Materials Branch

Personnel Complement

On Board: 95

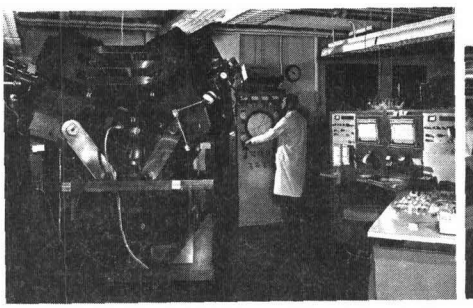
Total Estimated R&D Funding

Fiscal Year 1970: $3,451,000



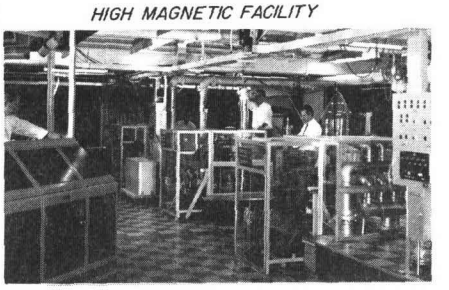
Dr. C. C. Klick

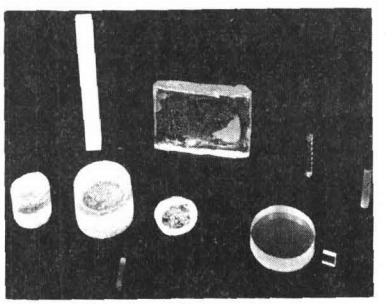
Solid State Division



TETRAHEDRAL PRESS AND X-RAY EQUIPMENT

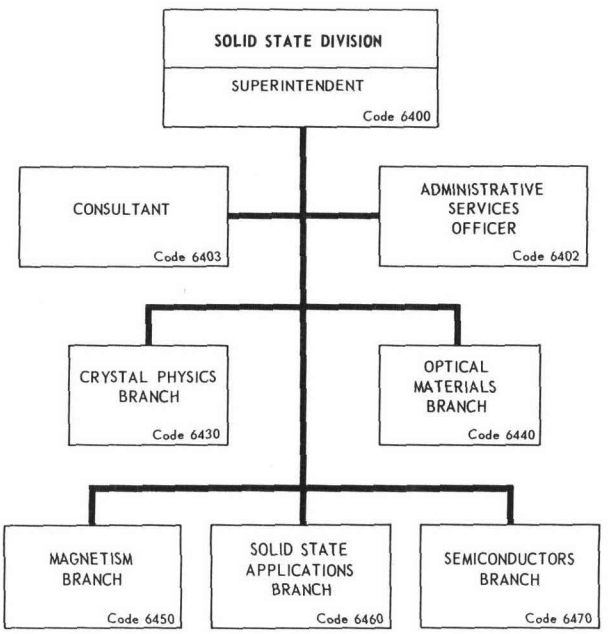
HIGH MAGNETIC FACILITY





LUMINESCENT PROPERTIES OF GLASS

- CRYSTAL PHYSICS
- OPTICAL MATERIALS
- MAGNETISM
- SOLID STATE APPLICATIONS
- SEMICONDUCTORS



Basic Responsibilities

The Solid State Division is concerned with basic and applied research in the physics of materials, principally solids, and with the interaction of matter with radiation. Its purposes are to increase understanding of the physical principles involved, to pursue applications of military and industrial problems, and to serve as a corps of experts in solids for the Laboratory specifically and the Navy generally. The research work of the Division is fairly comprehensive in magnetism, semiconductors, and alkali halides. Important work is also carried on in surface physics, structure and optical properties of glass, properties of metals at low temperatures and high magnetic fields, the effects of high pressures on solids and radiation damage. Applications in solid state dosimeters, semiconductor photovoltaic cells, information storage systems, and infrared detectors are being pursued actively.

Branches

Crystal Physics

- High-pressure effects
- Ferroelectric materials

Optical Materials

- Electronic properties of nonmetal crystals and glasses
- Radiation induced defects, color centers
- Lattice dynamics

Magnetism

- Electronic and nuclear paramagnetism
- Spin-ordered magnetic phenomena
- Magnetism and superconductivity at ultra-low temperatures

Solid State Applications

- Environmental effects on semiconductor and dielectric materials and devices

Semiconductors

- Electronic energy levels and band structure
- Semiconductor applications
- Physical properties of semiconductors
- Cryomagnetism
- Lattice Vibrations
- IR detectors
- IR light sources such as semiconductor lasers

Key Personnel

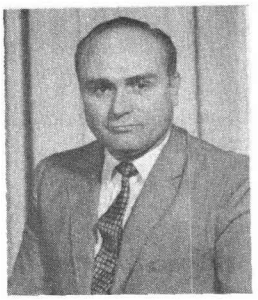
Name	*Title*
Dr. C. C. Klick	Superintendent
Mr. J. R. Clement	Associate Superintendent (Acting)
Mr. J. R. Clement	Consultant
Dr. P. B. Alers	Head, Crystal Physics Branch
Dr. M. N. Kabler	Head, Optical Materials Branch
Dr. G. T. Rado	Head, Magnetism Branch
Mr. E. L. Brancato	Head, Solid State Applications Branch
Dr. S. Teitler	Head, Semiconductors Branch (Acting)

Personnel Complement

On Board: 91

Total Estimated R&D Funding

Fiscal Year 1970: 3,154,000

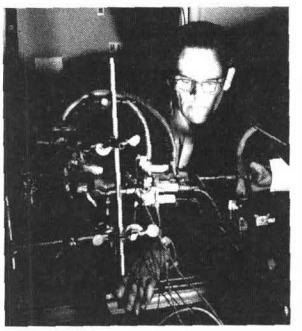


Dr. H. Rabin

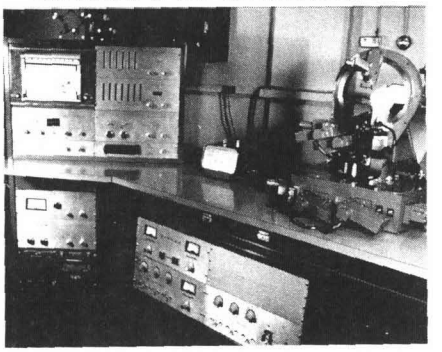
Optical Sciences Division

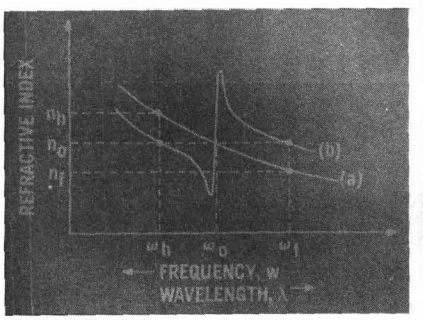
- QUANTUM OPTICS
- APPLIED OPTICS
- INFRARED

GLASS LASER

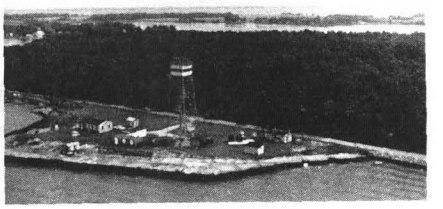


AUTOMATIC X-RAY REFRACTOMETER

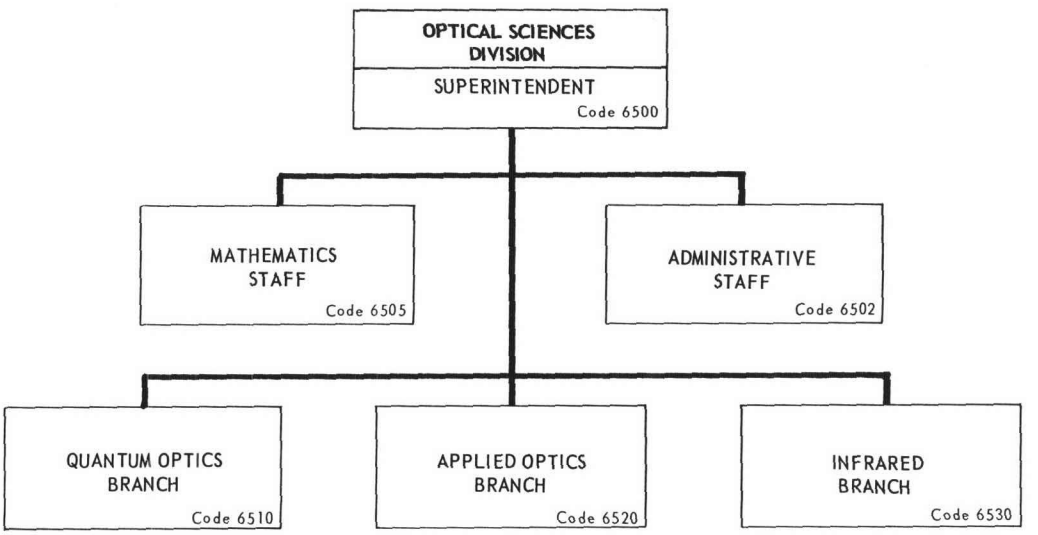




PHASE MATCHING IN NONLINEAR OPTICS



TILGHMAN ISLAND



Basic Responsibilities

The Optical Sciences Division is concerned with research in the generation, propagation, detection, and processing of radiation in all regions of the electromagnetic spectrum where optical techniques predominate; these are generally regions where the detectors are not fast enough to follow the field frequency and most commonly include frequencies from x-rays through infrared. The research is concerned with increasing understanding of basic physical principles, applying these principles to the development of technology and techniques which will assist in the solution of military problems, and developing a body of experts in optical sciences to serve the Laboratory specifically and the Navy generally. The work of the Division includes studies in quantum optics, infrared physics, atmospheric optics, optical technology, hydrological optics, holography, optical systems, and a variety of field measurement programs on optical problems of specific interest.

Staff Activity

Mathematics Staff

X-ray crystallography
Noncentrosymmetric space groups
Simulation of atmospheric turbulence
Consultations

Branches

Quantum Optics

Nonlinear optical phenomena
EMR interactions in matter
Laser action and devices
Optical Parametric Oscillators
Up-conversion
Quantum effects in materials

Applied Optics

Laser applications
Atmospheric and undersea optics and propagation
Optical communication and night viewing
Optical information processing
Optical technology

Infrared

Night vision and communication
IR characteristics of military targets
Special purpose IR devices
IR Laser technology
Atmospheric optics

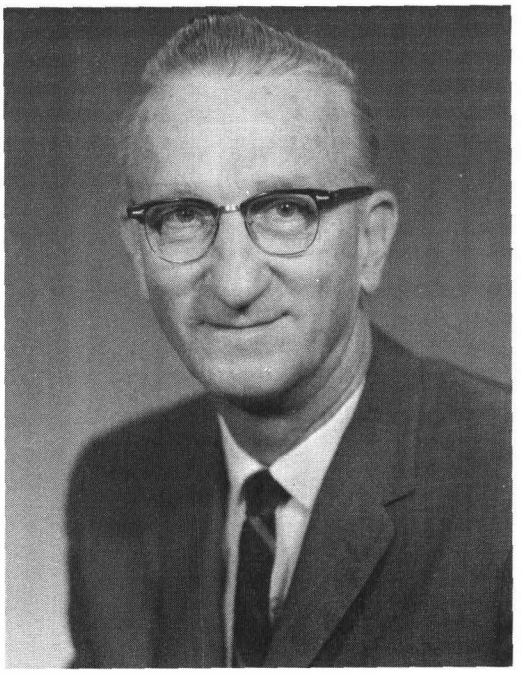
Key Personnel

Name	*Title*
Dr. H. Rabin	Superintendent (Acting)
Dr. H. A. Hauptman	Head, Mathematics Staff
Dr. H. Rabin	Head, Quantum Optics Branch
Dr. L. F. Drummeter, Jr.	Head, Applied Optics Branch
Dr. H. Shenker	Head, Infrared Branch

Personnel Complement
On Board: 42

Total Estimated R&D Funding
Fiscal Year 1970: $1,993,000

General Sciences Area



Dr. Wayne C. Hall
Associate Director of Research for General Sciences

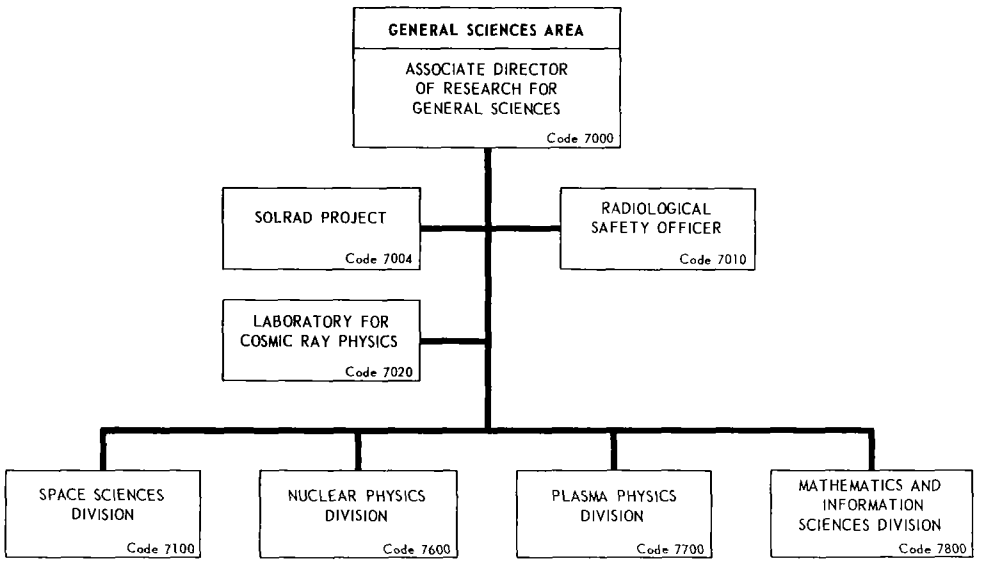
Dr. Hall [redacted]. He was educated at the University of Kansas, where he received a Bachelor of Science degree in electrical engineering in 1931, a Master of Science degree in physics in 1933, and a Ph.D. in physics in 1936. He was an Assistant Instructor in the Physics Department at the University of Kansas from 1931 to 1935.

Dr. Hall came to the Laboratory in 1935 for research on the use of fuel cells to effect direct conversion of heat energy. During the next ten years he was also involved in studies of energy conversion, electronic strain gages, and torsion meters. His work on the problem of interference of precipitation static on aircraft radio communications ultimately led to development of the antiprecipitation static antenna and fittings now used on military and civilian aircraft to ensure the reliability of radio communications and radio navigational aids during severe weather conditions.

In January 1945 Dr. Hall was appointed Assistant Head of the Aircraft Electricity Division and later, in 1946, Superintendent of the Division. In this position he was responsible for a group of scientists conducting research and development on electrical power systems for aircraft, basic research in electricity and magnetism, and basic research in solid state physics and physical phenomena at ultralow temperatures. From 1948 through 1951, in addition to his duties as a Division Superintendent, he was Scientific Officer at NRL in charge of a project from the Los Alamos Scientific Laboratory involving diagnostic measurements in the atomic weapons program. Early in 1954 he became Superintendent of the Solid State Division at the Laboratory and was shortly thereafter appointed to the position of Associate Director of Research for Nucleonics. The title of this position was redesignated Associate Director of Research for General Sciences in February 1966.

Dr. Hall received the Distinguished Civilian Service Award in 1946 "for distinguished achievement in research on mitigation of precipitation static interference encountered by aircraft flying in adverse weather conditions."

Dr. Hall is a member of several professional societies, including the American Physical Society, Sigma Xi, RESA, Tau Beta Pi, and the National Philosophical Society and is a Fellow of the Institute of Electrical and Electronics Engineers and the Washington Academy of Sciences. He is the author of many technical papers and has been granted a number of patents.



Key Personnel

Dr. W. C. Hall	Associate Director of Research for General Sciences
Mr. E. W. Peterkin	Technical Project Manager
Mr. L. A. Brauch	Radiological Safety Officer
Dr. M. M. Shapiro	Head, Laboratory for Cosmic Ray Physics
Dr. H. Friedman	Superintendent, Space Science Division
Dr. J. McElhinney	Superintendent, Nuclear Physics Division
Dr. A. C. Kolb	Superintendent, Plasma Physics Division
Dr. P. B. Richards	Superintendent, Mathematics & Information Sciences Division

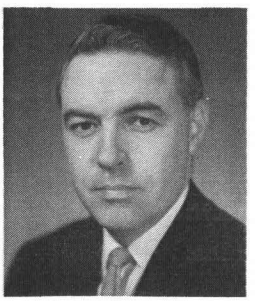
SOLRAD PROJECT

Basic Responsibilities

The SOLRAD Project was established to support NAVAIR exploratory development tasks in solar x-ray monitoring, and specifically to (1) develop, construct, test, evaluate, and provide launch support of SOLRAD satellites, (2) track, command, and acquire satellite telemetry, and (3) reduce, analyze, and transmit solar emission data for scientific and application purposes.

Key Personnel

Name	*Title*
Mr. E. W. Peterkin	Technical Project Manager
Mr. R. W. Kreplin	Scientific Program Manager
Mr. C. H. Chrisman	Assistant Manager for Data Processing
Mr. P. W. Wilhelm	Assistant Manager for Space Craft
Mr. G. E. Leavitt	Technical Assistant for Experiments Electronics



Mr. E. W. Peterkin

Manpower Support: 35 Man-years

Total Estimated R&D Funding

Fiscal Year 1970: $2,238,000

RADIOLOGICAL SAFETY OFFICE

Basic Responsibilities

The Health Physics Staff is assigned the overall responsibility for radiological safety at the Naval Research Laboratory and acts, as requested, as representative of the Office of Naval Research in radiological safety matters. The NRL radiological safety program has three primary purposes: (1) to assure that all operations using ionizing radiation are safe and in compliance with Federal Regulations; (2) to provide employees with instruments, instructions, and assistance to assure radiation safety in the performance of their duties; and (3) to conduct research in radiation dosimetry, instrumentation, and methodology.

Key Personnel

Name	*Title*
Mr. L. A. Brauch	Radiological Safety Officer
Mr. R. L. Flournoy	Senior Health Physicist
Mr. T. L. Johnson	Head, Research Section
Mr. J. N. Stone	Head, Operations Section
Mr. R. B. Luerson	Head, Accelerators and Analysis Section

Mr. L. A. Brauch

Personnel Complement

On Board: 19

Total Estimated R&D Funding

Fiscal Year 1970: $392,000

LABORATORY FOR COSMIC RAY PHYSICS

Basic Responsibilities

The Laboratory for Cosmic Ray Physics conducts a program of fundamental investigations of cosmic radiation–its composition and spectra, its origin, its "age," its propagation through space, its interactions with particles and fields in the regions of space that it traverses, and its role in various astrophysical phenomena. The program is framed so as to be broadly responsive to the anticipated technical requirements of the Navy and the general research and development program of the Department of Defense.

Key Personnel

Name	*Title*
Dr. M. M. Shapiro	Chief Scientist
Mr. B. Stiller	Head, Charged Particles (Section A)
Mr. N. Seeman	Head, Gamma Rays (Section B)
Dr. R. Silberberg	Senior Scientist
Mr. F. W. O'Dell	Senior Scientist

Dr. M. M. Shapiro

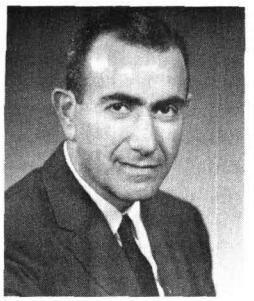
Personnel Complement

On Board: 24

Total Estimated R&D Funding

Fiscal Year 1970: $771,500

Space Science Division



Dr. H. Friedman

UPPER AIR PHYSICS
RADIO ASTRONOMY
ROCKET SPECTROSCOPY

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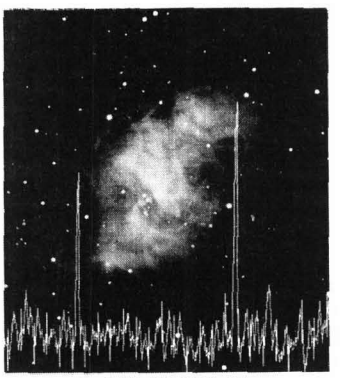
E. O. HULBURT CENTER
FOR SPACE RESEARCH



X-RAY PULSAR IN THE CRAB NEBULA

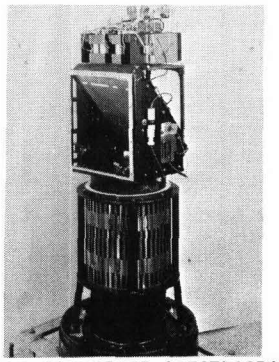
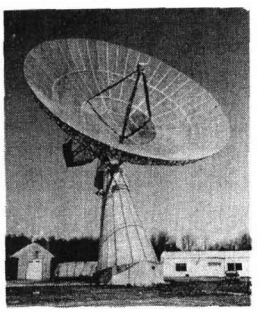
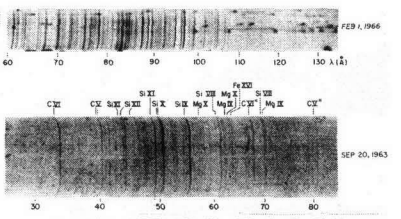


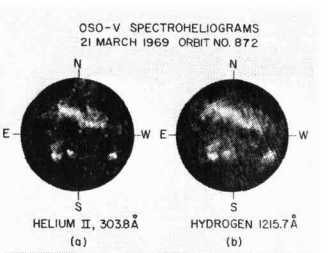
IMAGE-CONVERTER SPECTROGRAPH FOR FAR-UV ROCKET ASTRONOMY

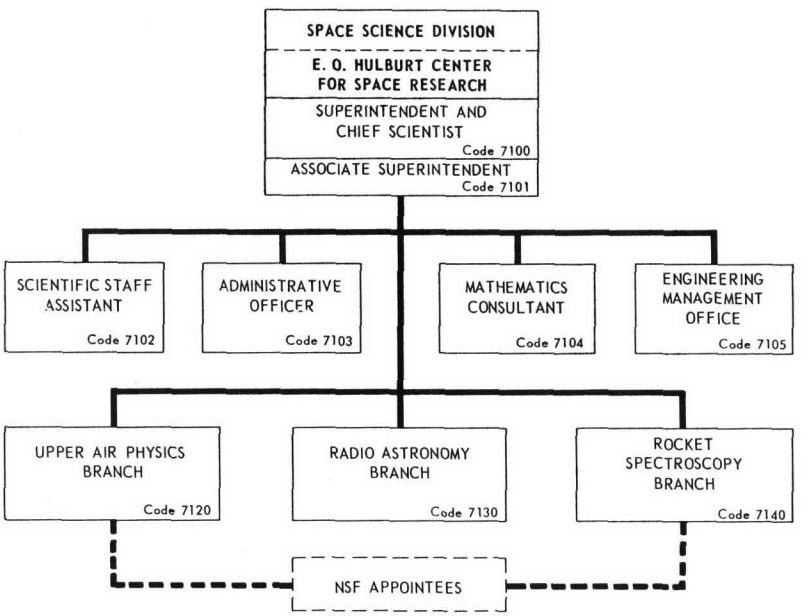
RADIO TELESCOPE MARYLAND POINT





X-RAY SPECTRUM OF THE SUN





Basic Responsibilities

The Space Science Division conducts research, development, and tests in the fields of upper air physics, astronomy, and astrophysics. Satellites and rockets are used to obtain information on radiation from the sun and celestial sources, and to study the composition and behavior of the ionosphere. Radio telescopes are used for astronomical observations. Results are of importance to radio communications, to utilization of the space environment, and to the fundamental understanding of natural radiation phenomena.

Branches

Upper Air Physics

- Gamma-ray, x-ray, ultraviolet, and infrared astronomy
- Aeronomy
- Solar x-ray monitoring satellites
- Electronic imaging studies
- Meteor astronomy

Radio Astronomy

- Galactic and extragalactic radio astronomy
- Radar measurements of earth-moon distance and topography of moon
- Radar and microwave applications to oceanography

Rocket Spectroscopy

- X-ray and ultraviolet solar spectroscopy
- Spectroheliographic and coronagraphic research
- Laboratory astrophysics
- XUV spectroradiometry
- Apollo telescope mission solar research

E. O. Hulburt Center for Space Research

The program is that of the combined Upper Air Physics, Rocket Spectroscopy, and Radio Astronomy Branches. It allows graduate and post-graduate students and visiting faculty members to cooperate with NRL in space research.

Key Personnel

Name	*Title*
Dr. H. Friedman	Superintendent
Dr. P. Mange	Associate Superintendent (Acting)
Dr. B. Lepson	Mathematics Consultant
Dr. T. A. Chubb	Head, Upper Air Physics Branch
Mr. C. H. Mayer	Head, Radio Astronomy Branch
Dr. R. Tousey	Head, Rocket Spectroscopy Branch
Dr. H. Friedman	Chief Scientist, Hulburt Center

Personnel Complement

On Board: 132

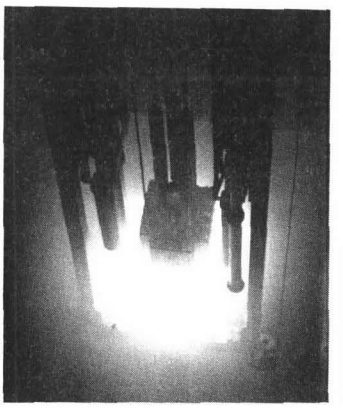
Total Estimated R&D Funding

Fiscal Year 1970: $14,027,900

Nuclear Physics Division

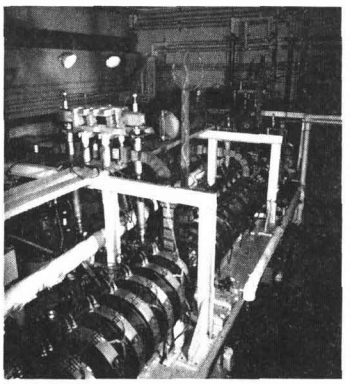
Dr. E. A. Wolicki

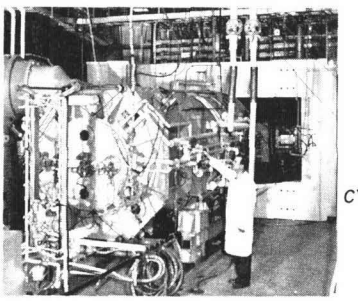
- CYCLOTRON
- LINAC
- NUCLEAR SYSTEMS
- REACTORS
- THEORY
- VAN DE GRAAFF
- X-RAY OPTICS



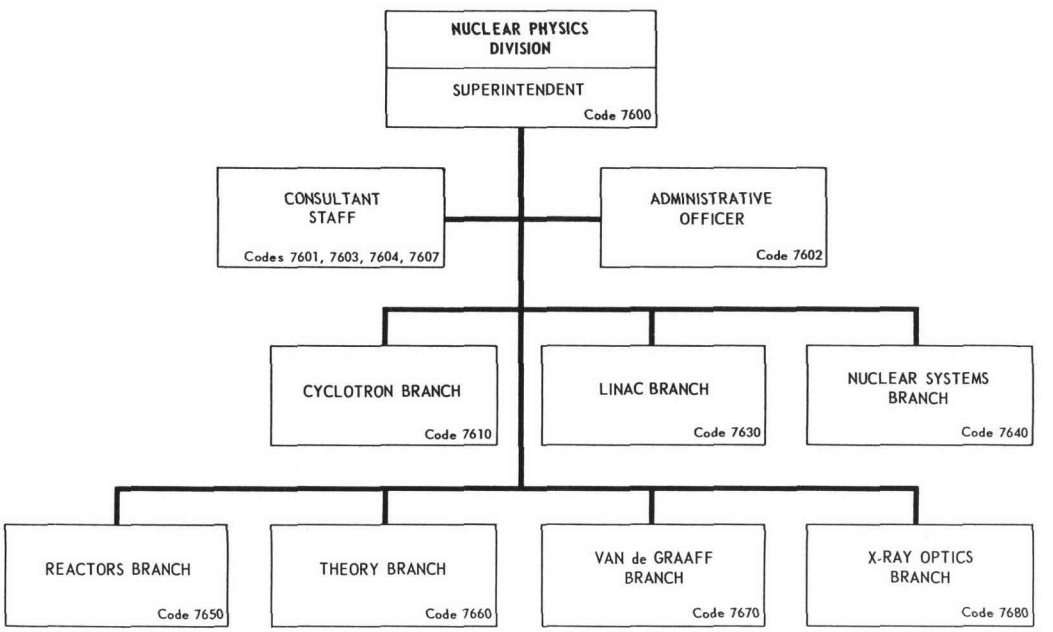
REACTOR CORE

LINAC





CYCLOTRON



Basic Responsibilities

The Nuclear Physics Division is engaged in a broad program of basic and applied research in nuclear physics and related areas. Included are theoretical and experimental programs in properties of nuclei, nuclear forces, nuclear reactions, shielding studies, x-ray and electron optics, materials analysis, and nuclear-weapon-related research. The Division operates a 75-MeV sector focussing cyclotron, 60-MeV Linac, 1-Mw reactor, 5-MeV Van de Graaff, and other particle accelerators and radiation sources.

Branches

Cyclotron

- Charged particle nuclear reactions
- Nuclear structure
- Charged particle scattering
- Neutron shielding
- Radioactivation analysis
- Production of radioactive sources

Linac

- Electron scattering
- Photonuclear reactions
- Nuclear excitation
- Neutron capture reactions
- Pulsed radiation effects
- Radioactivation analysis

Nuclear Systems

- Low-level nuclear radiation detectors for special purposes

Reactors

- Neutron activation analysis
- Production of radioactive sources
- Neutron capture reactions
- Radioactive decay

Theory

- Nuclear reactions
- Field theory
- Elementary-particle physics
- Nuclear structure
- Mathematical physics

Van de Graaff

- Charged particle nuclear reactions
- Nuclear structure
- Radiation damage due to charged particles
- Surface and film analysis by nuclear techniques
- Monoenergetic neutrons

X-Ray Optics

- X-ray spectral measurements
- X-ray fluorescence analysis
- Electron probe micro-analysis

Key Personnel

Name	*Title*
Dr. E. A. Wolicki	Superintendent (Acting)
Dr. C. V. Strain	Consultant
Mr. F. H. Attix	Consultant
Dr. R. O. Bondelid	Head, Cyclotron Branch
Dr. T. F. Godlove	Head, Linac Branch
Mr. D. C. Cook	Head, Nuclear Systems Branch
Dr. K. W. Marlow	Head, Reactors Branch
Dr. A. W. Sáenz	Head, Theory Branch
Dr. K. L. Dunning	Head, Van de Graaff Branch
Mr. L. S. Birks	Head, X-Ray Optics Branch

Personnel Complement

On Board: 118

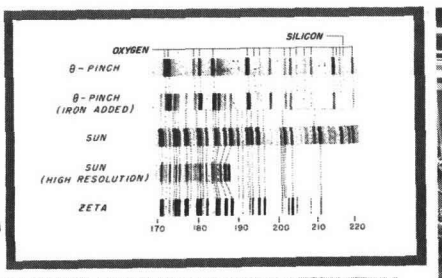
Total Estimated R&D Funding

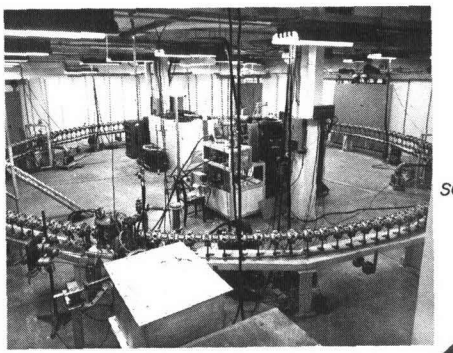
Fiscal Year 1970: $3,939,800

Dr. A. C. Kolb

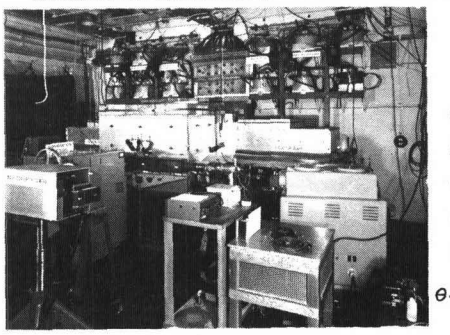
Plasma Physics Division

STAR VS. LAB SPECTRA



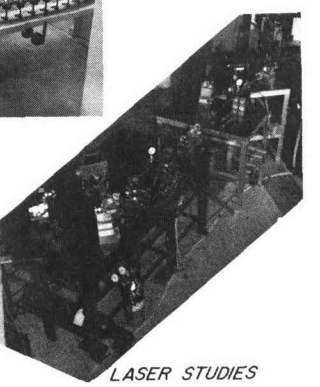


SOZOTRON

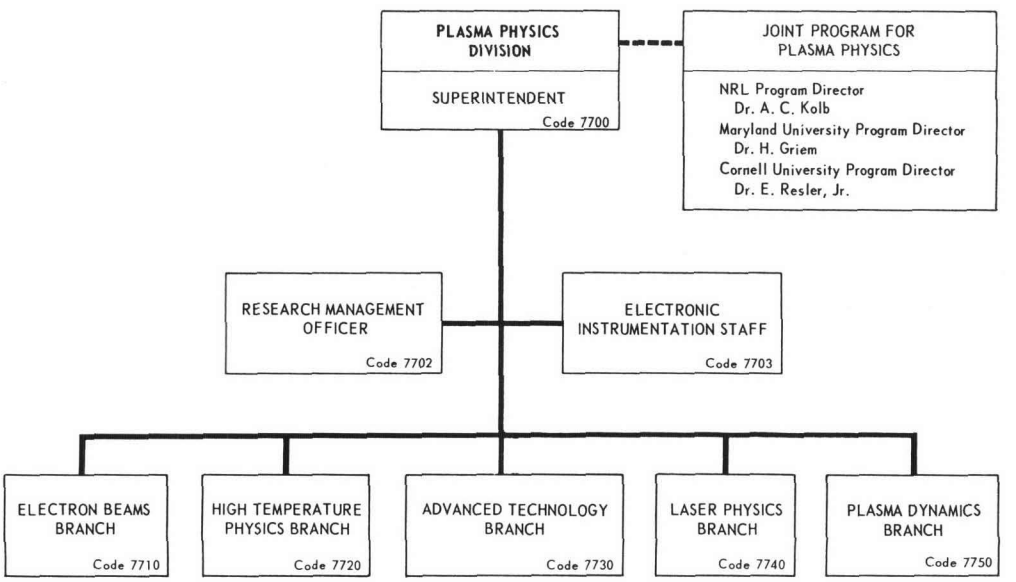


θ-PINCH FACILITY

- ELECTRON BEAMS
- HIGH TEMPERATURE PHYSICS
- ADVANCED TECHNOLOGY
- LASER PHYSICS
- PLASMA DYNAMICS



LASER STUDIES



Basic Responsibilities

The Plasma Physics Division conducts both basic and applied experimental and theoretical research. Examples of effort underway include: fusion physics and the generation and containment of high-temperature plasmas, directed toward eventual power sources; laboratory astrophysics; electron beams; collision-free shock waves; laser-produced plasma and high-power lasers. This Division, the University of Maryland, and Cornell University engage in a joint program of research in plasma physics. In addition to increasing significantly the scientific breadth of the participating institutions, the program is acquainting graduate students with research frontiers in plasma physics through association with leading scientists in the field. Students have an opportunity to use NRL facilities and talent for thesis research, and NRL scientists, in turn, are able to use the research facilities of both universities.

Branches

Electronic Instrumentation

Instrumentation support to the Division for control measurement of experiments

Electron Beams

Production and applications of intense electron beams
Beam stabilization

High Temperature Physics

Physics and utilization of ultra-high-temperature plasmas
Plasma chemistry

Advanced Technology

Technological support to the Division in the form of electrical, mechanical, optical, and vacuum systems

Laser Physics

Physics of solid state chemical and gas lasers
Nonlinear optics

Plasma Dynamics

Theoretical and numerical simulation studies of problems in nonlinear plasma dynamics

Key Personnel

Name	*Title*
Dr. A. C. Kolb	Superintendent
Mr. J. D. Shipman	Head, Electronic Instrumentation Staff
Mr. D. C. dePackh	Head, Electron Beams Branch
Dr. R. C. Elton	Head, High Temperature Physics Branch
Dr. W. A. Lupton	Head, Advanced Technology Branch
Dr. G. J. Wolga	Head, Laser Physics Branch (Acting)
Dr. A. C. Kolb	Head, Plasma Dynamics Branch (Acting)

Personnel Complement

On Board: 88

Total Estimated R&D Funding

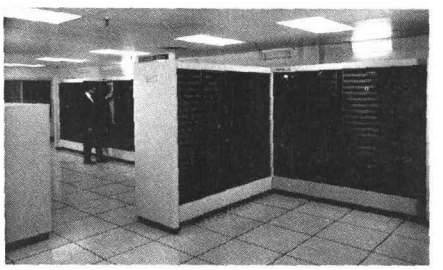
Fiscal Year 1970: 5,933,500

Dr. P. B. Richards

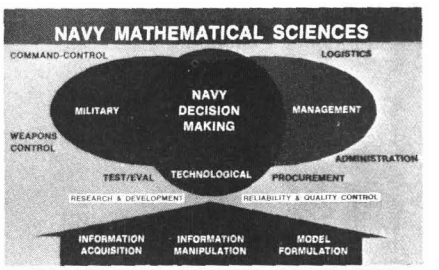
Mathematics and Information Sciences Division

- RESEARCH COMPUTATION CENTER
- INFORMATION SYSTEMS
- MATHEMATICS RESEARCH CENTER

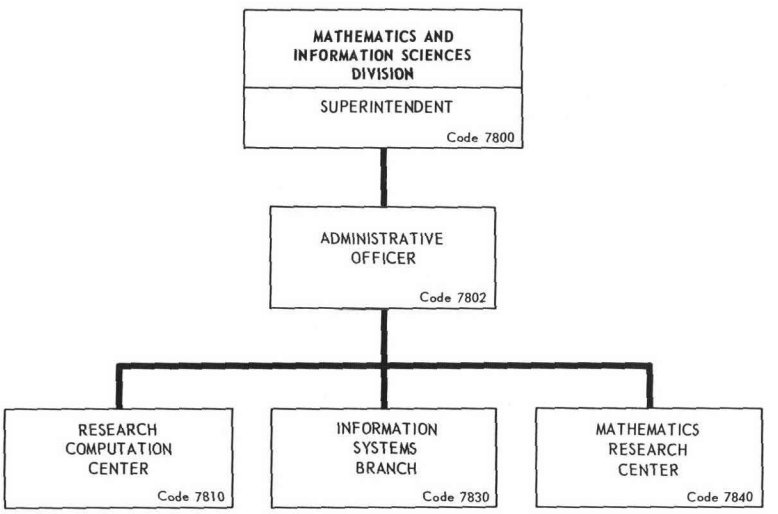
RESEARCH COMPUTATION CENTER



CDC 3800 COMPUTER



MATHEMATICS SCIENCE COORDINATION



Basic Responsibilities

The Mathematics and Information Sciences Division conducts basic and applied research in the mathematical sciences; determines present and future Navy needs with reference to mathematics and the computer-oriented sciences; and creates and maintains the competence required to formulate and to meet these needs.

Branches

Research Computation

- Data engineering and operations
- Analog computer
- Programming
- Programming systems
- Information retrieval

Information Systems

- Surveillance and intelligence
- Engineering applications
- Computer science
- Information system development
- Operations analysis and logistics

Mathematics Research Center

- Functional analysis
- Ordinary and partial differential equations
- Special functions
- Approximation theory
- Functions of a complex variable
- Diophantine approximations
- Stochastic processes
- Control theory
- Numerical methods

Key Personnel

Name	*Title*
Dr. P. B. Richards	Superintendent
Mr. A. B. Bligh	Head, Research Computation Branch
Dr. B. Wald	Head, Information Systems Branch
Dr. P. B. Richards	Head, Mathematics Research Center (Acting)

Personnel Complement

On Board: 68

Total Estimated R&D Funding

Fiscal Year 1970: $1,640,000

Oceanology Area

Dr. Ralph R. Goodman
Associate Director of Research for Oceanology

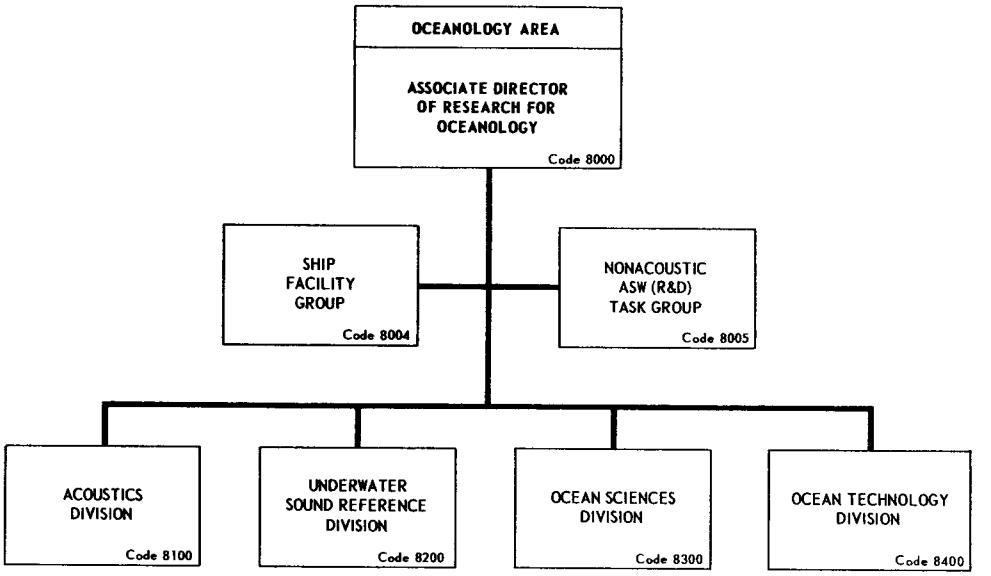
Dr. Goodman [redacted] He attended the University of Michigan, at Ann Arbor, where in 1950 he received a B.S. degree in mathematics, in 1951 a B.S. in physics, in 1952 an M.S. in physics, and in 1958 a Ph.D. in physics.

Before coming to NRL in September 1968, Dr. Goodman had held positions at NEL, at Colorado State University, and at the SACLANT ASW Research Center in La Spezia, Italy. He began his career as a scientist with the U.S. Navy Electronics Laboratory at San Diego, California, where he remained for 18 months. He left NEL in 1959 to join the staff of Colorado State University as an Assistant Professor; while serving in that capacity from 1959 to 1961, he also conducted research in theoretical physics and gave lectures and performed consulting services outside the University.

From 1961 to 1963, Dr. Goodman served as a consultant to the Applied Physics Group at the SACLANT ASW Research Center, La Spezia, Italy.

He then returned to Colorado State University, where from 1963 to 1968 he served as Professor of Physics. During his last year there (1968), he also served as the Acting Chairman of the Department of Physics.

Dr. Goodman is a member of the American Physical Society, the Acoustical Society of America, the American Geophysical Union, the American Institute of Physics, Sigma Xi, Phi Kappa Phi, and Tau Beta Pi. He was also a member of the Board of Trustees of the Colorado State University Research Foundation and the NAS/NRC Committee on Undersea Warfare.



Key Personnel

Dr. R. R. Goodman	Associate Director of Research for Oceanology
Mr. A. L. Gotthardt	Ship Facility Group
Mr. F. C. Macdonald	Nonacoustic ASW (R&D) Task Group (Acting)
Dr. J. C. Munson	Superintendent, Acoustics Division
Mr. R. J. Bobber	Superintendent, Underwater Sound Reference Division
Dr. V. J. Linnenbom	Superintendent, Ocean Sciences Division
Mr. J. A. Kies	Superintendent, Ocean Technology Division (Acting)

SHIP FACILITY GROUP

Basic Responsibilities

The Ship Facility Group is responsible for coordinating and providing ship services, sea-going facilities, and specialized expertise common to and required by the at-sea experiments of Research Divisions under the Associate Director of Research for Oceanology.

Key Personnel

Name	*Title*
Mr. A. L. Gotthardt	Head, Ship Facility Group

Mr. A. L. Gotthardt

Personnel Complement

On Board: 13

Total Estimated R&D Funding

Fiscal Year 1970: $2,542,000

NONACOUSTIC ASW R&D TASK GROUP

Basic Responsibilities

The Nonacoustic ASW R&D Task Group consolidates the NRL efforts in the area of nonacoustic anti-submarine warfare research and development and also acts as the management center for the Nonacoustic Submarine Effects (NASE) program fiscally supported by the NAVAIRSYSCOM.

Key Personnel

Name	*Title*
Mr. F. C. Macdonald	Director, Nonacoustic ASW R&D Task Group (Acting)

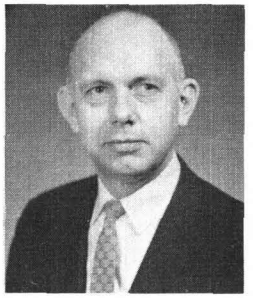
Mr. F. C. Macdonald

Personnel Complement

On Board: 3

Total Estimated R&D Funding

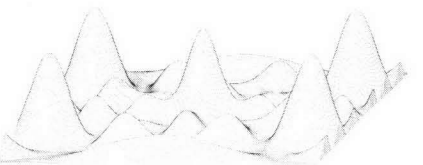
Fiscal Year 1970: $205,000

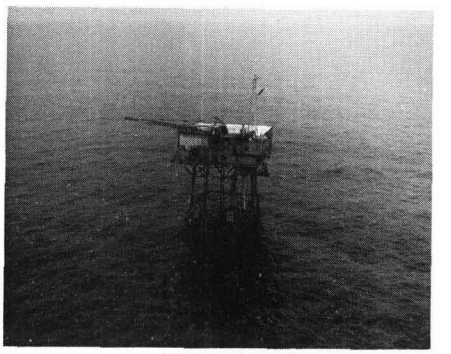


Dr. J. C. Munson

Acoustics Division

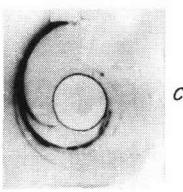
ELEVATION-AZIMUTH ARRAY RESPONSE



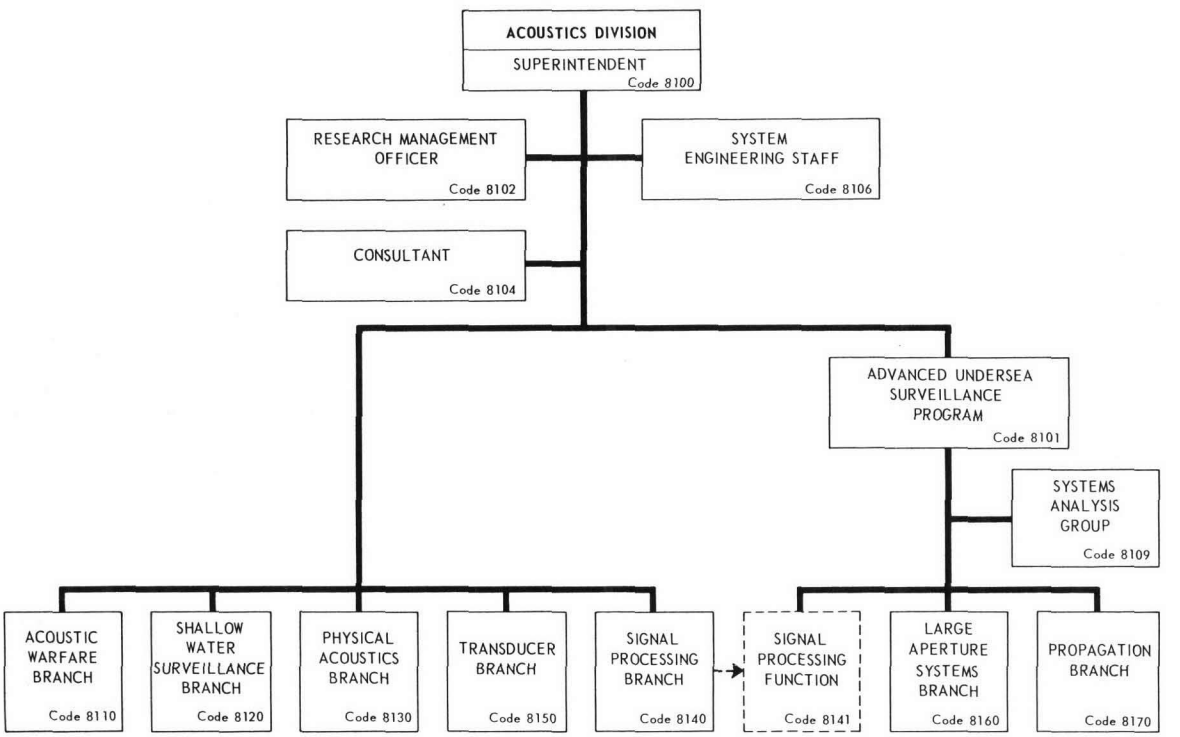


ARGUS ISLAND

- ACOUSTIC WARFARE
- LARGE APERTURE SYSTEMS
- PHYSICAL ACOUSTICS
- SIGNAL PROCESSING
- TRANSDUCER
- PROPAGATION
- SHALLOW WATER SURVEILLANCE



CREEPING WAVE PHENOMENA



Basic Responsibilities

The Acoustics Division has major responsibility for basic research and development in undersea acoustic surveillance. The spectrum of work covered in the program includes theoretical acoustics, system concepts, validation of operational concepts, and systems analysis. The Division also conducts theoretical and experimental research programs in physical acoustics, ocean acoustics, and predictive oceanography to develop theory and models of the interaction of acoustics with structures and the ocean environment for the Navy undersea warfare programs and for research and development programs of the Division in the fields of transducers, signal processing, and acoustic warfare. The Division works with research programs outside the Division, such as materials, oceanography, and deep ocean technology, to provide these supporting disciplines with information on long-range material and on environmental data and technology needs, and to obtain cooperation on joint programs which must cross disciplinary lines.

Staff Activities

System Engineering

- Support and ship facility
- Acoustic sources
- Engineering research
- Sea spider motion studies

Systems Analysis

- Systems studies
- Strategic and tactical systems planning and evaluation

Branches

Acoustic Warfare

- Acoustic countermeasure techniques
- Surveillance system countermeasures

Transducer

- Basic radiation theory
- Electroacoustic modeling
- Transducer physical models
- Transducer mathematical models
- Calibration of large transducer arrays
- Transducer materials research

Physical Acoustics

- Microacoustics
- Flow acoustics
- Ultrasonics

Signal Processing

- Signal processing and display
- Information processes for underwater acoustics

Shallow Water Surveillance

- Boundary interactions

Large Aperture Systems

- Active target detection and classification
- Propagation, coherency, and wave front behavior
- Low frequency monostatic and bistatic reverberation studies

Propagation

- Long-range propagation models
- Application of low-range low-frequency propagation
- Scattering from ocean bottom, surface, and volume
- Natural and man-made noise

Key Personnel

Name	*Title*
Dr. J. C. Munson	Superintendent
Mr. A. T. McClinton	Head, System Engineering Staff
Mr. R. R. Rojas	Head, Advanced Undersea Surveillance Program
Mr. F. C. Titcomb	Head, Systems Analysis Group (Acting)
Mr. R. H. Mathes	Head, Acoustic Warfare Branch
Mr. R. H. Ferris	Head, Shallow Water Surveillance Branch (Acting)
Dr. W. G. Neubauer	Head, Physical Acoustics Branch (Acting)
Mr. H. L. Peterson	Head, Signal Processing Branch (Acting)
Mr. S. Hanish	Head, Transducer Branch
Dr. B. B. Adams	Head, Large Aperture Systems Branch
Dr. H. P. Bucker, Jr.	Head, Propagation Branch

Personnel Complement

On Board: 137

Total Estimated R&D Funding

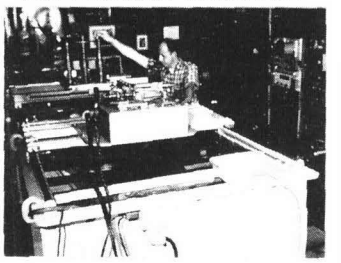
Fiscal Year 1970: $7,259,500

Underwater Sound Reference Division

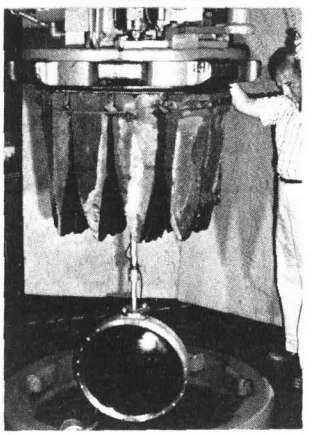
Mr. R. J. Bobber

- UNDERWATER ELECTROACOUSTIC MEASUREMENT METHODS
- UNDERWATER ELECTROACOUSTIC STANDARDS
- UNDERWATER ELECTROACOUSTIC TEST & EVALUATION

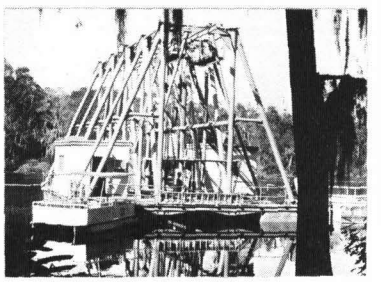
HIGH-FREQUENCY LABORATORY



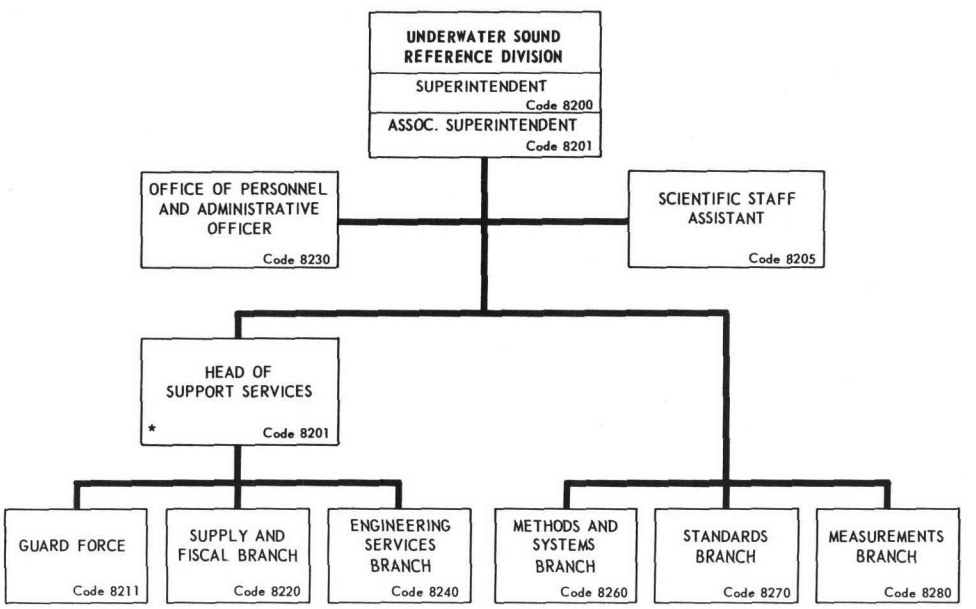
ANECHOIC TANK



UNDERWATER SOUND REFERENCE DIVISION, ORLANDO, FLORIDA



LEESBURG FACILITY - CALIBRATION BARGE



*Indicates collateral duty as Assoc. Superintendent.

Basic Responsibilities

The Underwater Sound Reference Division is a focal point in the Navy for standardization in the science and technology of underwater sound measurements. Its research and development program is aimed at expanding the state of the art and providing Navy in-house expertise. Reference calibration measurements in a large complex of specialized facilities and calibrated standard transducers are available to all naval activities and contractors in support of undersea warfare programs.

Research and Development Branches

Methods and Systems

- Calibration theory
- Measurement methods
- Digital and analog systems
- Acoustic absorption
- Cavitation studies

Standards

- Transducer materials
- Electroacoustic standards
- Acoustic sources
- Specialized electroacoustic transducers
- Vibration analysis techniques
- Standard loan services

Measurements

- Standard calibration services
- Sonar transducer test and evaluation
- Measurements on acoustic materials
- Simulated deep-submergence measurements
- Measurement facility development

Key Personnel

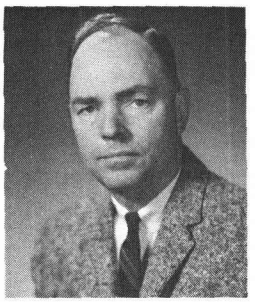
Name	*Title*
Mr. R. J. Bobber	Superintendent
Mr. D. T. Hawley	Associate Superintendent
Mr. J. M. Taylor	Scientific Staff Assistant
Mr. J. C. Michael	Supply and Fiscal Officer
Mrs. A. Z. Shehee	Personnel and Administrative Officer
Mr. J. F. Prandoni	Head, Engineering Services Branch
Mr. G. A. Sabin	Head, Methods and Systems Branch (Acting)
Mr. I. D. Groves	Head, Standards Branch
Dr. W. L. Paine	Head, Measurements Branch

Personnel Complement

On Board: 100
(Graded 80, Ungraded 20)

Total Estimated R&D Funding

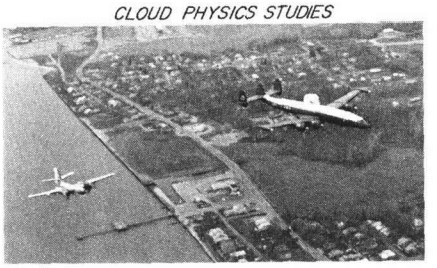
Fiscal Year 1970: $1,441,000

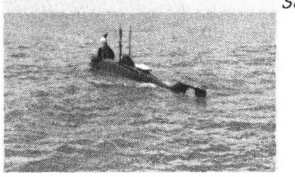


Dr. V. J. Linnenbom

Ocean Sciences Division

CLOUD PHYSICS STUDIES

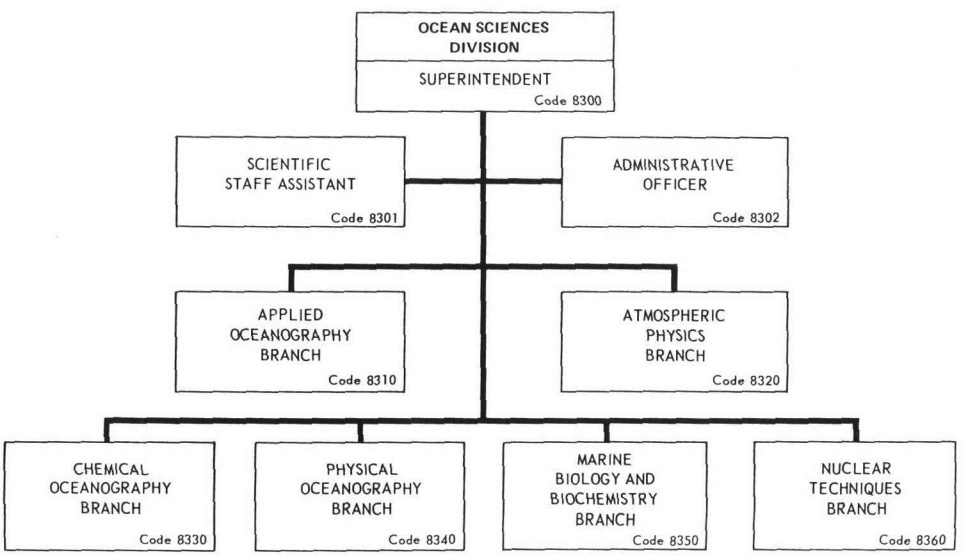




SURFACE EFFECTS

- APPLIED OCEANOGRAPHY
- ATMOSPHERIC PHYSICS
- CHEMICAL OCEANOGRAPHY
- MARINE BIOLOGY & BIOCHEMISTRY
- NUCLEAR TECHNIQUES
- PHYSICAL OCEANOGRAPHY
- AIR/SEA INTERACTIONS
- GEOPHYSICS AND SEA FLOOR

NANSEN BOTTLE PREPARATION



Basic Responsibilities

The Ocean Sciences Division conducts basic and applied research and development in the ocean sciences. Included are studies of the physics, chemistry, geology, and biology of the oceans directed toward an improved understanding and use of the oceans as the major operating environment of the Navy. Practical results lead ultimately to improvement in the design and effectiveness of naval equipment, materials, and systems.

Branches

Applied Oceanography

- Nonacoustic detection of submarines
- Hydrodynamics of submerged bodies
- Infrared characteristics of the ocean

Atmospheric Physics

- Air-Sea interactions
- Atmospheric Dynamics
- Cloud Physics
- Weather instrumentation

Chemical Oceanography

- Physical and analytical chemistry of seawater, dissolved gases, and marine sediments

Physical Oceanography

- Hydrodynamics and turbulence of the oceans
- Marine geophysics

Marine Biology & Biochemistry

- Biodegradation of materials in the marine environment
- Organic chemistry of seawater
- Biochemistry of marine organisms

Nuclear Techniques

- Application of nuclear techniques to oceanography

Key Personnel

Name	*Title*
Dr. V. J. Linnenbom	Superintendent
Dr. A. H. Schooley	Senior Research Scientist
Dr. M. F. M. Osborne	Consultant
Mr. H. L. Clark	Head, Applied Oceanography Branch
Dr. J. E. Dinger	Head, Atmospheric Physics Branch
Dr. C. H. Cheek	Head, Chemical Oceanography Branch
Dr. J. E. Elliot	Head, Physical Oceanography Branch (Acting)
Dr. J. M. Leonard	Head, Marine Biology and Biochemistry Branch
Mr. J. I. Hoover	Head, Nuclear Techniques Branch

Personnel Complement

On Board: 96

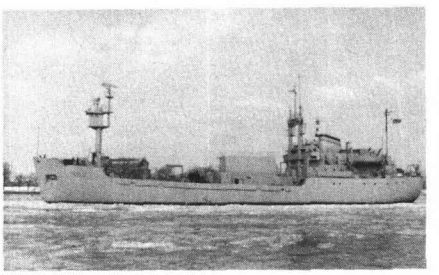
Total Estimated R&D Funding

Fiscal Year 1970: $3,567.00

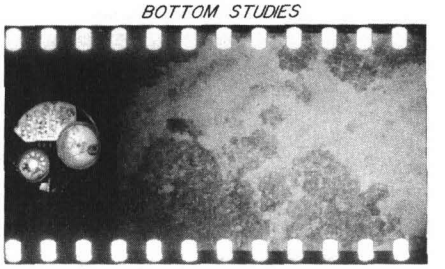
Ocean Technology Division

Dr. J. P. Walsh

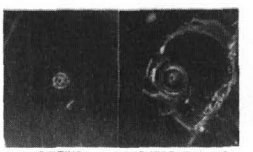
MIZAR



BOTTOM STUDIES

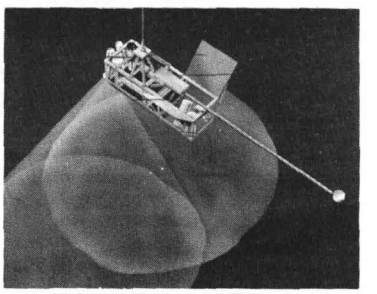


- OCEAN ENGINEERING
- OCEAN MATERIALS CRITERIA
- OCEAN STRUCTURES

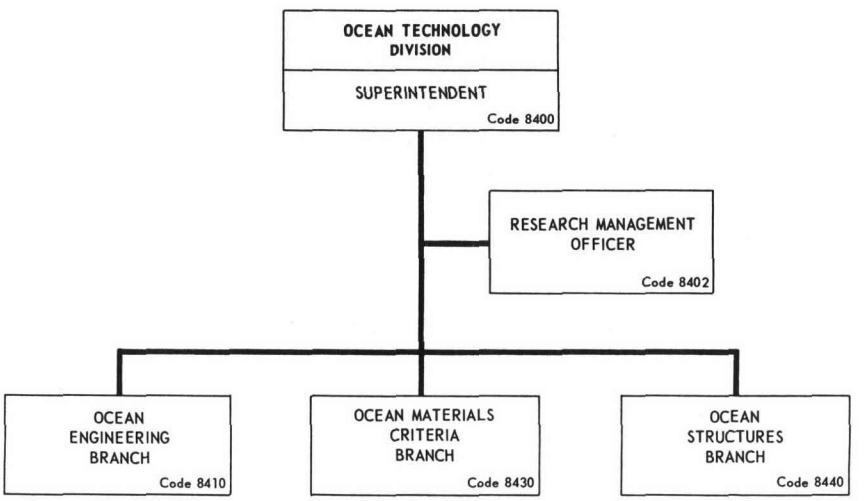


PITTING SERVERE FLAKING

HYDROSTATIC PRESSURE FAILURE STUDIES



UNDERWATER CAMERA



Basic Responsibilities

The Ocean Technology Division researches, develops, and applies specialized equipment, instrumentation, techniques for conducting ocean and ocean-floor operations, and evolves operational technology for advanced systems. The Division utilizes advanced materials and design technology for engineering optimization of required equipment. It also conducts research activities in select areas of ocean technology with coupling and support activities related to other ongoing research and development in these and other fields of interest. This Division in conjunction with other Divisions of NRL and out-of-house agencies brings to bear on crucial problems the collective expertise available.

Branches

Ocean Engineering

- Deep-ocean instrumentation and investigations
- Hydrodynamics of deep towing
- Reliable acoustic paths

Ocean Materials Criteria

- Fracture mechanics and fracture strength
- Plastic flowing
- Compression failure mechanisms
- Armor research and development
- Deep submergence materials-structures
- Missile component failure
- Nondestructive testing

Ocean Structures

- Shipboard shock fundamentals
- Shock protection for weapons systems
- Methods for design against shock
- Fracture mechanics design studies
- Developmental studies of prototypes
- Shock strength of materials
- Shock propagation and instrumentation
- Hydromechanic studies

Key Personnel

Name	*Title*
Dr. J. P. Walsh	Superintendent
Dr. W. H. Vaughan	Consultant
Mr. C. L. Buchanan	Head, Ocean Engineering Branch
Mr. J. A. Kies	Head, Ocean Materials Criteria Branch
Dr. R. O. Belsheim	Head, Ocean Structures Branch

Personnel Complement

On Board: 65

Total Estimated R&D Funding

Fiscal Year 1970: $2,489,000

Part 4
The Support Services Department

Captain Seymour N. Ross, USN
Director of Support Services

Captain Seymour N. Ross is a native of Newburgh, New York. He received his commission and B.S. degree from the U.S. Naval Academy in 1947; a Nav.E. degree from the Massachusetts Institute of Technology in 1952; and in 1957, a B.S. in metallurgy from the Carnegie Institute of Technology. He has also done graduate work in international relations at the University of California.

Prior to coming to NRL, Captain Ross served as Fleet Maintenance Officer with the staff of Commander-in-Chief, U.S. Naval Forces Europe, with Headquarters in London, England (1967-1969). As additional duty, he was Assistant Supervisor of Salvage, Europe. Before that he was the Planning and Estimating Superintendent at the Boston Naval Shipyard (1966-1967). Captain Ross also served tours of duty with the Shipbuilding Liaison Office at The Hague, The Netherlands (1963-1966); in the Design and Research and Development Divisions of the Bureau of Ships (1959-1963); and in the Development Divisions of the Office of the Chief of Naval Operations (1957-1959).

Captain Ross became Director of Support Services on September 30, 1969. In this position he administers the Supply, Technical Information, Engineering Services, Public Works, and Chesapeake Bay Divisions; the Medical Staff; the Management Engineer; and the Patent Counsel, all of which provide a wide spectrum of services in support of the Laboratory's research and development program.

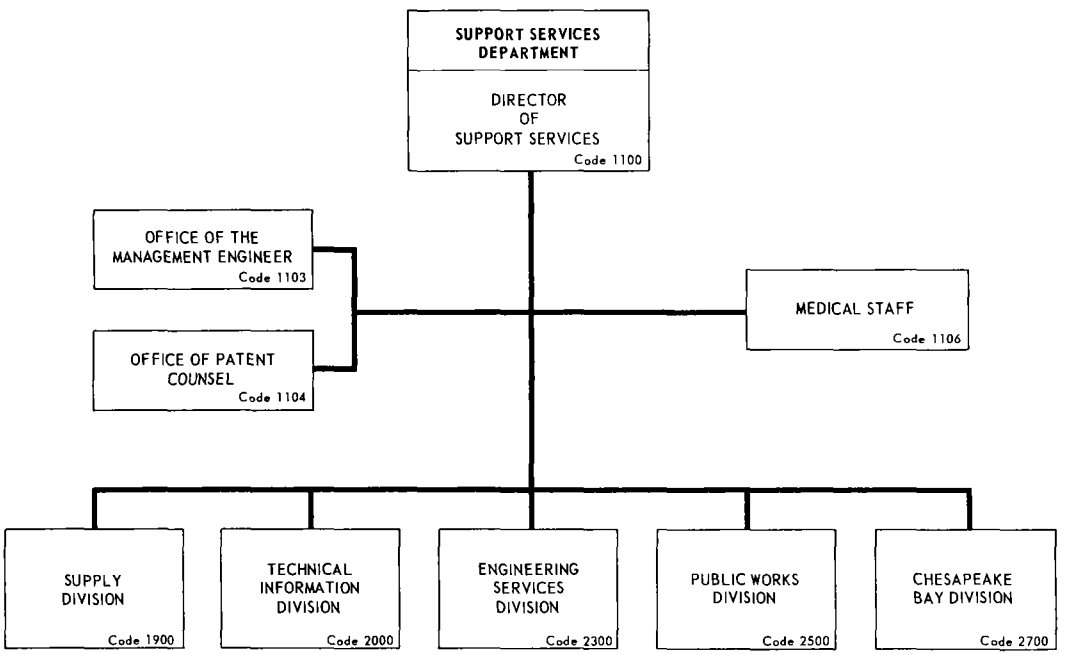
Captain Ross is a member of Sigma Xi, the Society of Naval Engineers, and the Marine Technology Society.

THE SUPPORT SERVICES DEPARTMENT

The Director of Support Services is a Naval Officer with the appropriate rank, training, and experience. His primary responsibility is the supervision, coordination, and control of the administrative and service operations required in support of the work of the Research Department.

Key Personnel

Name	Title	Code
CAPT S. N. Ross, USN	Director of Support Services	1100
Mr. S. L. Cohen	Management Engineer	1103
Mr. A. L. Branning	Patent Counsel	1104
LT M. D. Lieberman, MC, USN	Medical Officer	1106
CDR O. L. Woodbury, SC, USN	Supply Officer	1900
Mr. E. L. Smith	Head, Technical Information Division	2000
CDR R. B. Hayman, USN	Engineering Services Officer	2300
CDR C. F. Cook, Jr., CEC, USNR	Public Works Officer	2500
CDR R. S. Mason, USN	Chesapeake Bay Division Officer	2700



OFFICE OF THE MANAGEMENT ENGINEER

Basic Responsibilities

The Office of the Management Engineer provides staff support to management officials of the Laboratory in matters of administrative operations, management control, and facilities planning.

Key Personnel

Name	*Title*
Mr. S. L. Cohen	Management Engineer
Mr. A. M. Toscano	Deputy Management Engineer

Personnel Complement

On Board: 8

Mr. S. L. Cohen

OFFICE OF PATENT COUNSEL

Basic Responsibilities

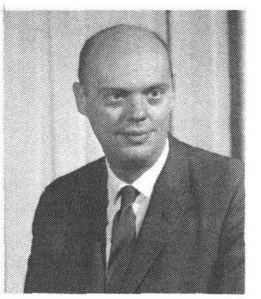
The Office of Patent Counsel provides services concerning inventions, patents, trademarks, copyrights, and other related matters. Patent applications are prepared, filed, and prosecuted on NRL inventions of significance to the Government. The Patent Counsel serves as consultant and adviser on patent and data clauses in R&D and procurement contracts. Assistance is provided the Research Department through state-of-the-art searches in the patent literature pertinent to particular research problems.

Key Personnel

Name	*Title*
Mr. A. L. Branning	Patent Counsel
Mr. R. J. Erickson	Deputy Patent Counsel

Personnel Complement *

On Board: 22



Mr. A. L. Branning

*Includes personnel physically located at ONR headquarters.

MEDICAL STAFF

Basic Responsibilities

The Medical Staff provides a comprehensive industrial health program. Its members serve in an advisory capacity on the Radiological, Safe Driving, Eye Hazard, and other Laboratory Committees, as directed.

Key Personnel

Name	*Title*
LT M. D. Lieberman, MC, USNR	Medical Officer
Mrs. H. N. East, RN	Occupational Health Nurse

Personnel Complement

On Board: 7

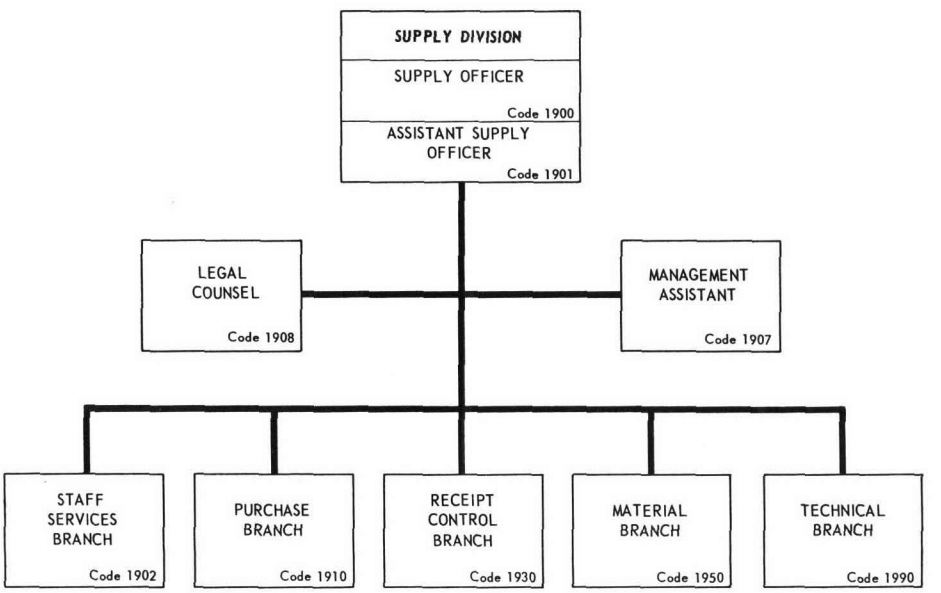
(Civilian 3, Military 4)

LT M. D. Lieberman

CDR O. L. Woodbury, USN

Supply Division

- STAFF SERVICES
- PURCHASE AND CONTROL
- MATERIAL
- TECHNICAL



Basic Responsibilities

The Supply Division provides service functions to the Laboratory including the operation of supply issue stores, procurement of equipment, material, and contractual services; receipt, inspection, and delivery of material and equipment; storage of inactive laboratory equipment; packing; shipping; traffic management; and survey and disposal of excess and unusable property.

During FY-1968 the Supply Division occupied 204,351 square feet of building space; its stores inventory value averaged $937,000; procurements totalled $45,700,000 stores issued totalled $2,400,000 and disposals totalled $3,400,000.

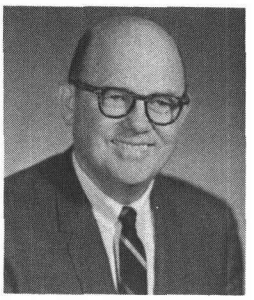
Key Personnel

Name	*Title*
CDR O. L. Woodbury, SC, USN	Supply Officer
LT J. R. Stafford, SC, USN	Assistant Supply Officer
Mr. A. S. Horton	Legal Counsel
Mr. L. Woods	Management Assistant
Mrs. P. Griffin	Head, Staff Services Branch
Lt J. R. Stafford, SC, USN	Head, Purchase Branch (Acting)
Mrs. V. S. Thomas	Head, Receipt Control Branch
Mr. H. W. Dickinson	Head, Material Branch
Mr. R. R. Black	Head, Technical Branch

Personnel Complement

On Board: 148

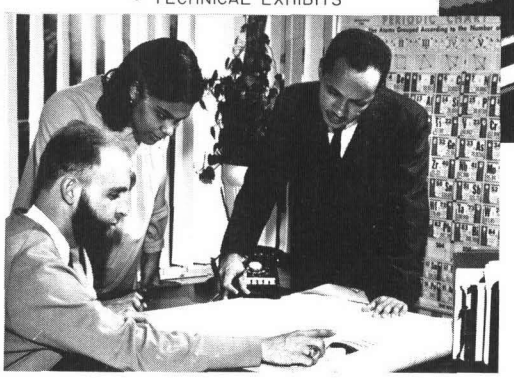
(Graded 89, Ungraded 57, Military 2)

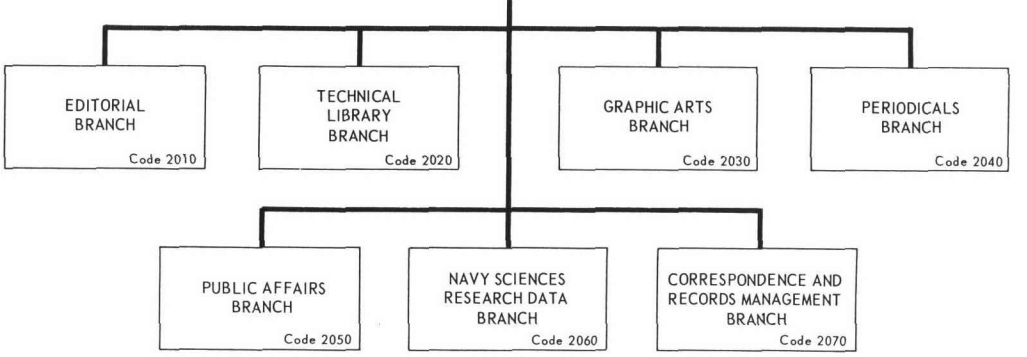


Mr. E. L. Smith

Technical Information Division

- EDITORIAL
- LIBRARY
- GRAPHIC ARTS
- PERIODICALS
- PUBLIC AFFAIRS
- NAVY SCIENCES RESEARCH DATA – ONR
- CORRESPONDENCE AND RECORDS MANAGEMENT
- TECHNICAL EXHIBITS





Basic Responsibilities

The Technical Information Division plans and administers the Laboratory's program of preparing and disseminating the results of scientific research through official publications, scientific journals, presentations, films, exhibits, and news media. It provides centralized professional services to both NRL and ONR in writing, editing, printing, exhibits, photography, graphic arts, public affairs, documentation, language-translations, and mail-records services. It operates one of the Navy's largest integrated technical libraries with holdings of 200,000 bound volumes and 350,000 technical reports.

Key Personnel

Name	*Title*
Mr. E. L. Smith	Head, Technical Information Division
Mrs. D. E. Cameron	Administrative Officer
Mr. H. S. Poole	Exhibits Officer
Miss L. A. Morgan	Librarian
Mr. W. H. Ramey	Head, Graphic Arts Branch
Mr. W. M. Leak	Head, Periodicals Branch
Mr. I. S. Rudin	Head, Editorial Branch
Mr. J. J. Lister	Head, Public Affairs Branch
Mr. R. Greenbaum	Head, Navy Sciences Research Data Branch
Mrs. M. G. Beall	Head, Correspondence and Records Management Branch

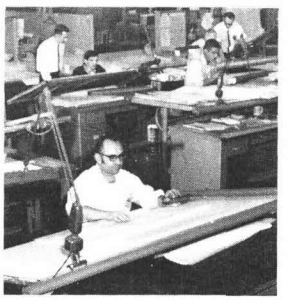
Personnel Complement

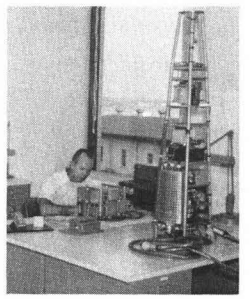
On Board: 163

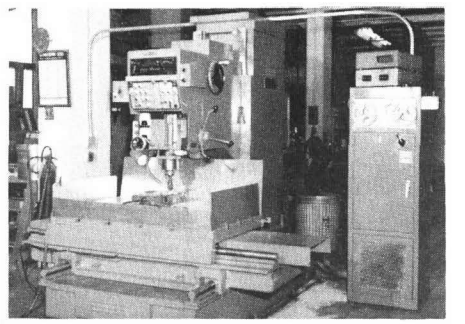
(Graded 146, Ungraded 17)

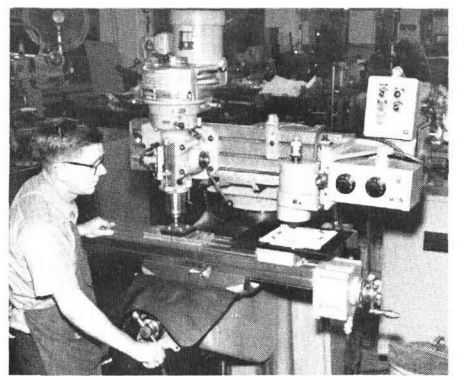
CDR R. B. Hayman, USN

Engineering Services Division

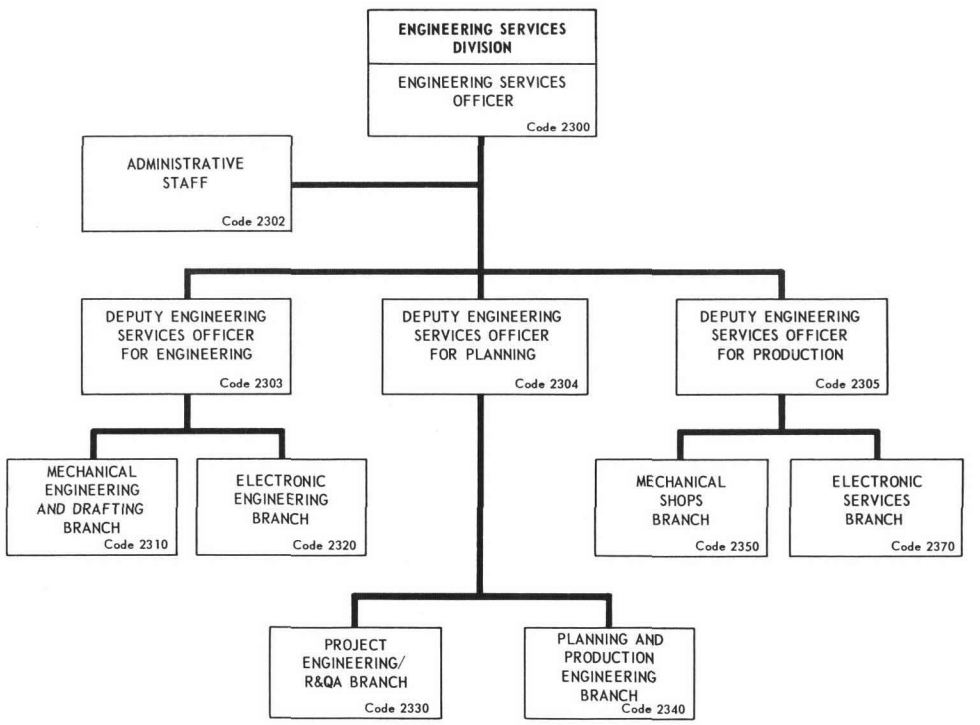








- MECHANICAL ENGINEERING AND DRAFTING
- ELECTRONIC ENGINEERING
- MECHANICAL SHOPS
- CHEMICAL PROCESSES SHOPS
- ELECTRONIC SERVICES
- PLANNING & PRODUCTION ENGINEERING
- PROJECT ENGINEERING



Basic Responsibilities

The Engineering Services Division provides the engineering, design, fabrication, assembly, and test of experimental research equipment in support of the Laboratory's research efforts.

Key Personnel

Name	*Title*
CDR R. B. Hayman, USN	Engineering Services Officer
Mr. P. R. Shifflett	Deputy Engineering Services Officer for Engineering
Mr. J. P. Manning	Deputy Engineering Services Officer for Production
Dr. L. A. DePue	Deputy Engineering Services Officer for Planning
Mr. C. T. McComb	Head, Mechanical Engineering and Drafting Branch
Mr. J. Brotzman	Head, Electronic Engineering Branch
Mr. D. R. Eggleston	Head, Mechanical Shops Branch
Mr. J. L. Leizear	Head, Electronic Services Branch
Mr. P. C. Buck	Head, Planning and Production Engineering Branch
Mr. E. Trexler	Head, Project Engineering/R&QA Branch

Personnel Complement

On Board: 553

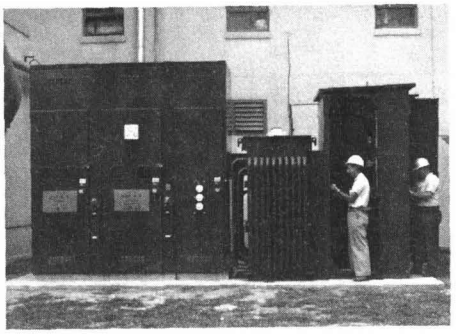
(Graded 185, Ungraded 367, Military 1)

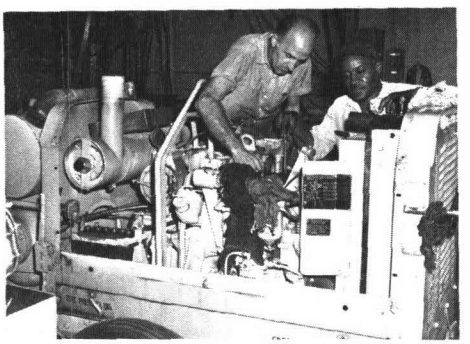
Management & Staff	58
Engineers	34
Technicians	116
Journeymen	248
Machine Operators & Helpers	41
Apprentices	55

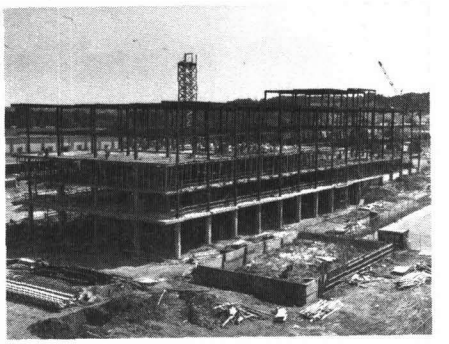
CDR C. F. Cook, Jr., USN

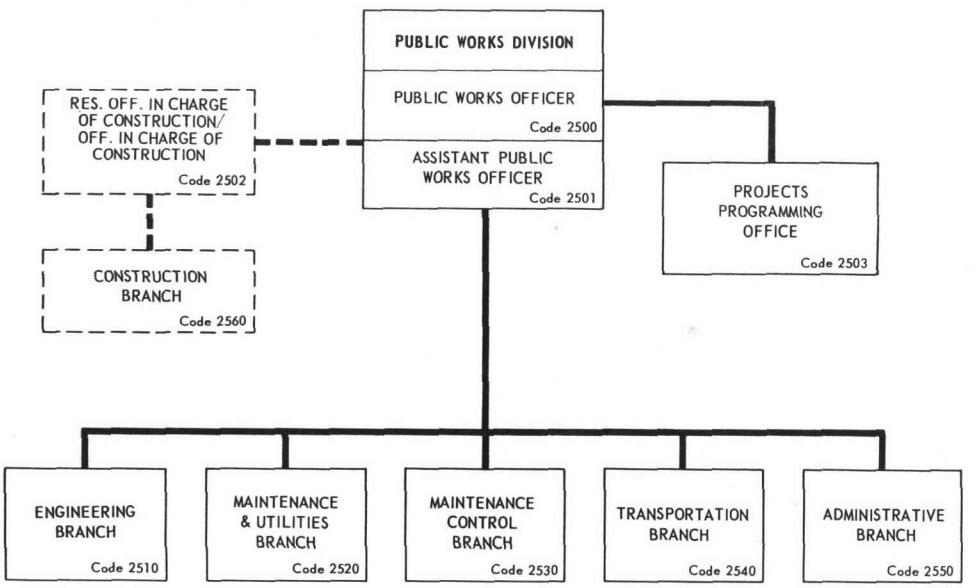
Public Works Division

- ENGINEERING
- MAINTENANCE AND UTILITIES
- MAINTENANCE CONTROL
- TRANSPORTATION
- CONSTRUCTION









Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL. This includes responsibility for the design, construction, operation, maintenance, and repair of all buildings, grounds, roads, utilities, and other structures and activities. Also included are transportation; weight-handling and heavy-construction equipment; heating and refrigeration plants; electric, water, steam, air, and gas supply distribution; telephone communication systems; and sewage disposal.

The Public Works Division provides professional consulting services to the scientific divisions on facilities planning and engineering.

Key Personnel

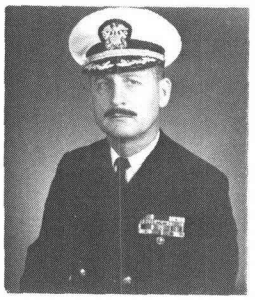
Name	*Title*
CDR C. F. Cook, Jr., CEC, USN	Public Works Officer
ENS W. E. Moore, CEC, USNR	Assistant Public Works Officer
*LT R. C. McInnes, CEC, USNR	Assistant ROICC
Mr. G. H. Seaver, Jr.	Projects Programming Office
Mr. J. R. Lescault	Administrative Officer
Mr. C. R. Parsons	Head, Engineering Branch
Mr. A. N. Gawthrop	Head, Maintenance & Utilities Branch
Mr. R. O. Weidman	Head, Maintenance Control Branch (Acting)
Mr. C. P. Trexler	Head, Transportation Branch
*Mr. J. Clark	Construction Engineer (ROICC/OICC)

Personnel Complement

On Board: 392

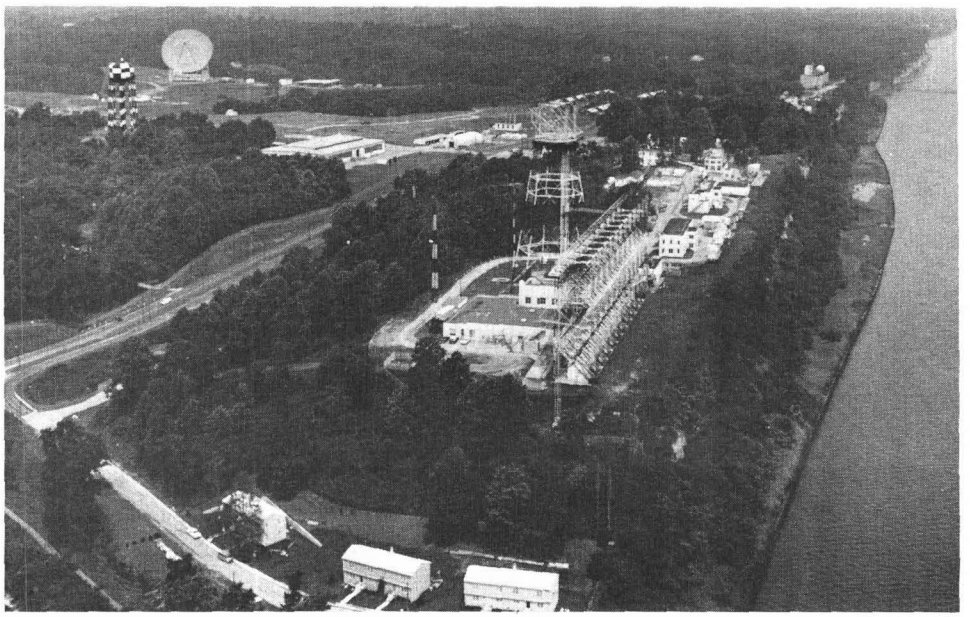
(Graded 47, Ungraded 343, Military 2)

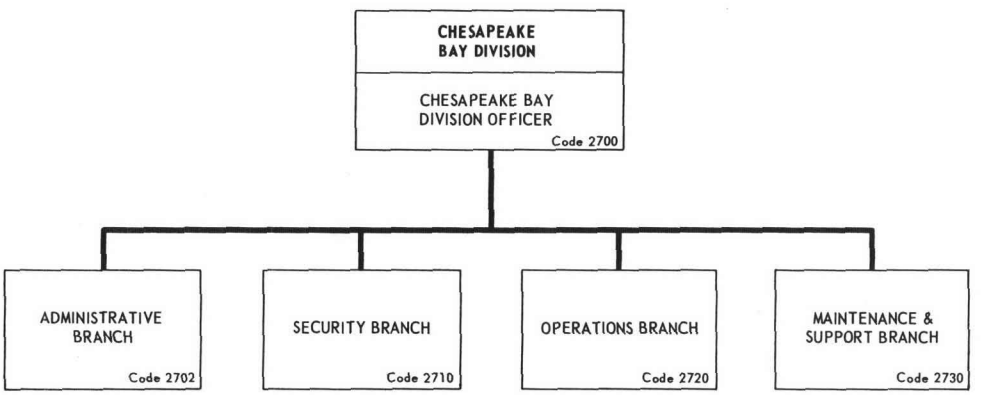
*On ceiling of Naval Facilities Engineering Command (Chesapeake Division)



CDR R. S. Mason, USN

Chesapeake Bay Division





Basic Responsibilities

The Chesapeake Bay Division provides and maintains facilities and services for test, development and evaluation of radar, radio, and fire control equipment. It also services and supports all research projects conducted at the Chesapeake Beach and Tilghman Island complexes of NRL.

The Physical Plant

Located in a relatively clear area away from any congestion or industrial interference, the main site, at Chesapeake Beach, covers 174.9 acres containing 197 structures of various size and construction, six of which are major laboratory buildings. There is over 200 feet of usable dock space with a water depth of 4 to 7 feet, located 2 miles north of the main site. Off-site facilities include the Tilghman Island Facility, located directly across the Bay from CBD at a distance of about 10 miles; the Theodolite House, at North Beach; and the Off-shore Platform, approximately 2 miles southeast of CBD in the Bay.

One 36-foot diesel-powered boat and five wherries are used in support of research projects and for transportation between off-site facilities. Housing includes 24 public quarters and one dormitory.

Key Personnel

Name	*Title*
CDR R. S. Mason, USN	Division Officer
Mr. F. R. Theodore	Administrative Officer
Mr. K. V. Davis	Security Officer
BMCM G. VandenBerg, USN	Operations Officer
Mr. R. M. Conlyn	Station Engineer

Research Division Representatives

Applications Research Division

Mr. A. C. Grosvenor, Applied Physics Branch
Mr. C. D. Porter, Dynamics Branch

Radar Division

Mr. M. W. Lehman, Radar Geophysics Branch and Division Representative
Mr. J. R. Ward, Airborne Radar Branch
Mr. W. K. Fliss, Search Radar Branch

Optical Sciences Division

Mr. T. H. Cosden, Infrared Branch

Personnel Complement

On Board: 91

(Graded 37, Ungraded 52, Military 2)

The Naval Research Laboratory has a continuing need for physical scientists, mathematicians, engineers, and supporting personnel. Vacancies are filled without regard to race, creed, color, sex, or national origin. Information concerning current vacancies will be gladly furnished upon request. Address all such inquiries to the Personnel Office (Code 1800), Naval Research Laboratory, Washington, D. C. 20390.